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ELECTRICAL WEST

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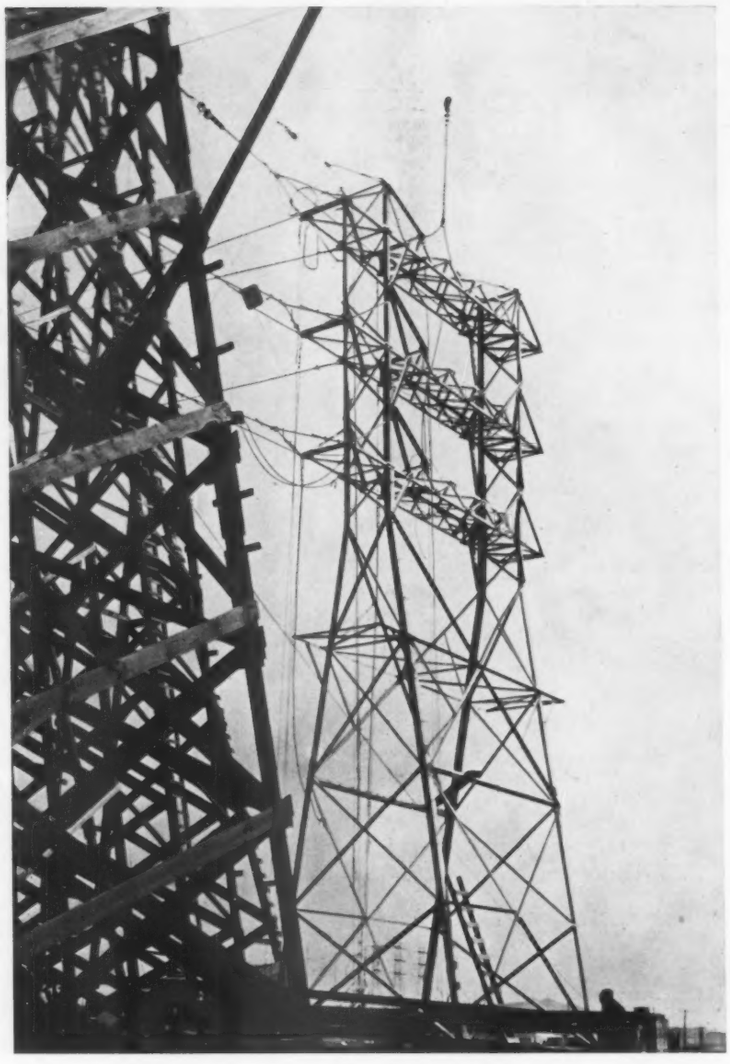

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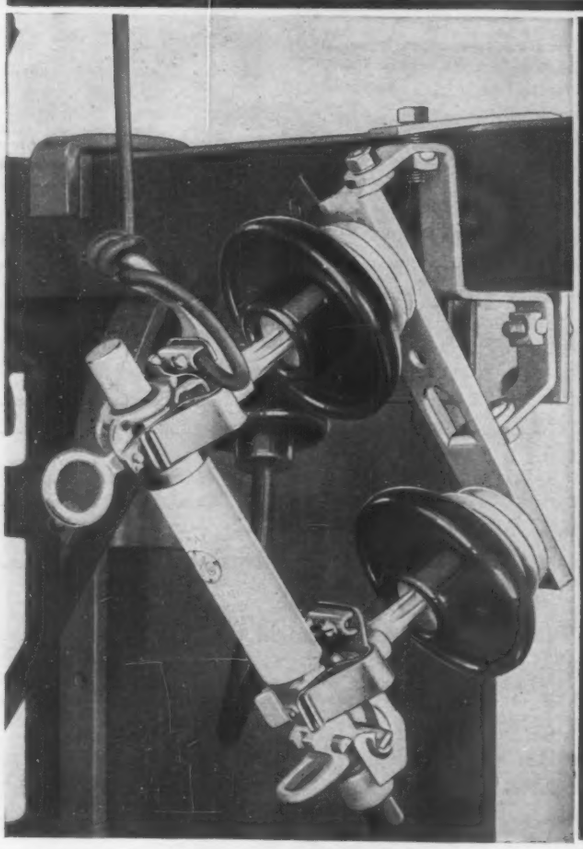
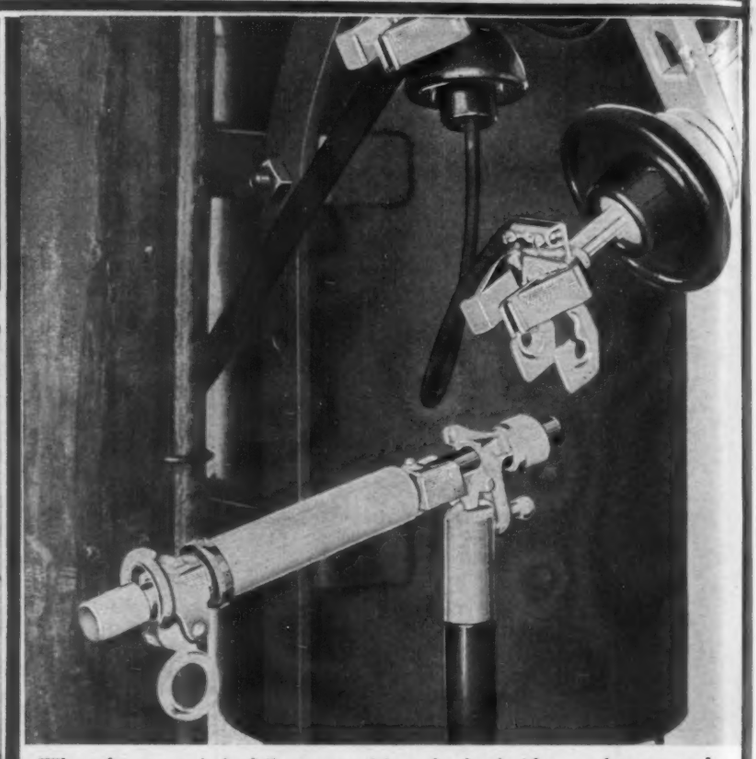
Two New Cutouts for



The G-E open-type cutout (7500/12,500Y volts and 15,000 volts) installed adjacent to a transformer



When the cutout is in full open position, the fuseholder can be removed with a standard switchhook

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ELECTRICAL WEST

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G. C. TENNEY, *Editor*

The Month

NEW life for the New Year is promised the entire California electrical industry in the reorganization of the Pacific Coast Electrical Bureau. It is to become the promotional and development instrument of electrification of home, business and factory.

▼

HARMONIZER of the various factions and branches of the industry when he lived, and creator of the new program around which the industry now plans to rally, C. T. Hutchinson had well earned the posthumous award now tendered in his honor. (See page 36.)

▼

SHALL states or the federal government regulate utilities or shall regulation go back to the quagmires of individual city regulation? The question is a live one in these political times. A sane discussion of it is good for the judgment. (See page 4.)

▼

PUBLIC ownership's missionary has been out West to convert heathen California, where the public already owns the power through customer shares. Until the pessimism of depression that public would not have listened to him.

▼

BIDS are to be called soon for the construction of Hoover (Boulder) Dam and Southern Sierras is rushing a power line to serve the works. No new developments along the legal front are apparent.

▼

"GIVE the dealer profit," says a commercial manager, "and he will do his own selling." Thus is set down one of the invisible points around which the merchandising merry-go-round whirls and sings. At least this focal point shifts from central station to manufacturer.

STEAM was found a necessity in the well watered Northwest when a battleship was made to stand by for a municipality, but Puget Sound had its new Shuffleton station operating to carry its load. This station is of interesting design. (See page 8.)

▼

MANUFACTURE of many products would improve under climate tailored to fit particular conditions, and nowhere is there a better illustration than the bakery in Imperial Valley which would be impossible without electrically made weather. (See page 26.)

▼

A MILLION refrigerators as a goal for 1931 seems a large quota until the organization which is to arrive at this sales total is understood. The West will figure prominently in both organization and results, its leaders predict.

▼

CONTROL is mostly knowledge of conditions. Thus a means to keep tab on construction conditions makes for job control which eliminates wastes and improves morale. (See page 18.)

Editorial

After 1930—A Happy New Year

WITH a sigh of relief from business and industry as an accompaniment, the sun has set upon 1930 and a new year has dawned. In the colors of the sunset was a rosy shade that promises for 1931 more sunshine and less of the fog, clouds, storms and floods of the last twelve months.

In the Far Western states the electrical industry has been spared much of the stormy weather that made sailing difficult for business and industry in other sections of the country. Effects of the general depression were slower in reaching this region. Peculiarly, experience has proved that any quickening or improvement which develops in the Eastern business centers has an immediate effect in this territory. So, then, the period of retarded business and industrial activity will be shorter here than elsewhere. Finally, the ever-prevailing optimism that has made the Westerner a target for the jibes and jokes of his Eastern brother, in this instance precluded the development here of the psychological pessimism that prevails in some other sections of the country.

Today 1930 is history and can be viewed in the light of lessons learned and experience gained. In predicting fair weather for 1931 ELECTRICAL WEST says to the electrical industry and its individual members, "Health, Happiness, Progress, and Prosperity for the New Year!"

This Is the Time To Reward Initiative

FOR AN industry whose growth and progress have been directly traceable to the exercise of individual initiative, the growing spirit of *laissez faire* that is finding expression within the ranks of the power companes is unpardonable. Simply because old standards, old methods, and old equipment have permitted a property to operate and "get by" in the past is no reason why a new idea, suggestion, or material does not deserve consideration and trial.

Increased size, holding company ownership, and centralized responsibility should not be permitted to serve as a check upon the exercise of initiative and courage on the part of a subordinate. There is nothing more deadening to progress than the feeling on the part of a man that if he runs his job in the same routine fashion that his predecessor operated it and does not make any mistakes, he will get credit from the boss. This, coupled with the knowledge that a suggestion for a change from the old way to something new, is only going to invite wrangling and red tape plus a blot on the service record if a mistake is made, is responsible for "ruts" in engineering, in operation, and in commercial development.

Some companies have successful plans for rewarding initiative and suggestions for improvements. Usually these are the companies with outstanding records for progress and development. They, as contrasted with some others, have found that encouragement to exercise initiative plus a real delegation of responsibility pays big dividends.

The New Electrical Bureau—A Monument to C. T. Hutchinson

PARTICULARLY appropriate but purely coincidental are two important announcements in this issue of ELECTRICAL WEST. The first is the posthumous award to Charles T. Hutchinson of the James H. McGraw Medal for Co-operation. The second is the perfection of the organization of the Pacific Coast Electrical Bureau. For just as Charles T. Hutchinson stood for practical co-operation among the many branches of the electrical industry and for the co-ordination of the various co-operative undertakings of that industry, so does the new organization of the Electrical Bureau mark the culmination of the ideal he held forth and the program he finally proposed.

As reorganized, the Bureau plan and program provide for every contingency that may arise in the development and promotion of sales plans that involve the interests of all branches of the industry. Furthermore, they furnish a common forum where the several groups of the industry may get together on neutral ground and work out common problems with the counsel of unbiased persons. Understanding and confidence are bound to result. The Bureau provides an unbiased mouthpiece for the industry as a whole to use in speaking to the public.

Under the new plan the various aims and policies of each of the organizations or groups concerned with the commercial development of the industry in California may be studied, co-ordinated and

applied practically. The regional division of working responsibility provides for local interest and permits modifications of any state-wide program to the needs of a particular territory of the state.

Furthermore, with a neutral body that is representative of every branch of the industry at the head of the Bureau, the interests of any one group will not be overlooked or overridden. Policies and programs will be shaped for carrying the message of the advantages of electrical service and servants to the homes, factories, stores and farms of the state so as to permit participation of every group within the industry.

In this manner is the dream of Charles T. Hutchinson realized. Much of his effort was devoted to the practical realization of this program just before he passed on. The new Pacific Coast Electrical Bureau with its broader ideals, its wider field of interest, its renewed vigor, and its basic program and policy should stand as a fitting monument to his memory.

Another Viewpoint on the Public Relations Problem

ALL OVER the country the electrical industry is speculating, in the light of election returns, on what is in store for it and what can be done about the situation.

As the basis for further speculation several major premises may be set down. First, the public utility branch of the business, which is now the storm center, is ably, efficiently, economically, and fairly managed in the public interest. It must be borne in mind that the public interest requires that enough hope of reward be held out to the industry so that capital may be attracted to it in sufficient volume to permit growth and continued fulfillment of its obligation to American industrial and social life. Holding and management companies, about which much of the storm has centered, have performed invaluable functions in this growth and are necessary to continuing development. Regulation through legally constituted state regulatory bodies has been reasonably effective in preventing abuses.

Finally, the industry must recognize that public relations activities have to some extent failed in that they have not produced any sort of unanimity of public belief that the electric utilities have been operated entirely in the public interest. At the polls the public continues to express its disapproval in general, and offers specific remedies in some localities where municipal ownership in one form or another is voted, or more stringent regulatory laws are demanded.

Arguing from these premises, it seems that the logical outcome of a continuance of the present public attitude will lead either directly to universal government ownership or to a system of regulation which will so squeeze out the hope of profit that growth will be curtailed seriously to the public's detriment. This latter condition itself could readily bring on government ownership as a last resort.

Concisely, the issue facing both the public and the power companies is: Shall the industry be allowed to continue to operate with the restrictions placed upon it by natural economic laws and governmental regulation, or shall the industry be socialized completely? If this were the whole issue the problem would be simple. But actually great difficulties present themselves, and these lie in the numerous local complications introduced from one hundred and one sources representing a wide variety of ramifications of the principal issue. The politicians have seen to that.

Despite the ramifications to the issue, ELECTRICAL WEST believes that the one common cause underlying the entire difficulty and contributing to the general misunderstanding is that the public believes that the cost of electricity is too high, and attributes this condition to some sin of omission or commission on the part of the power companies. Roughly, it is estimated that 15 per cent of the people understand the situation thoroughly and are satisfied all is for the best, while 85 per cent are either apathetic or hold the conviction that somehow in some measure they are being gouged.

Granting that this conviction exists, then the cause is not so much that old public relations methods have failed to produce the desired public attitude, but that the industry has done a poor merchandising job on the value and service of the commodity that it has for sale—electricity. With every argument in its favor and with proof to back up the statement that electricity today offers the greatest bargain in the public market place, the industry has become embroiled in political arguments, has thought of its problems in terms of institutional stories, has talked too much and too smugly to itself, and has overlooked the real job.

Apparently the problem is one of merchandising. Then it should be studied as such and the solution worked out in merchandising terms. Merchandising today means market analysis, sales policies, sales promotion, salesmanship, and advertising. The time has not only arrived, but is past due, when the commercial brains of the industry should be called into consultation. Let these men prove to the public that electricity today is a bargain. When they do that, most of the perplexing phases of the public relations problem will vanish.

The Industry

That Question of Regulation

In All This Political Outcry for Changes in Regulation What Are the Real Factors to Keep in Mind?

By GEO. L. MYERS,
Assistant to the President, Pacific Power & Light Company, and Northwestern Electric Company, Portland, Ore.

REGULATION of public utilities has become an outstanding issue of current agitation. It has been an issue of periodical interest in a more or less contentious degree since the inception of regulation. It seems to be particularly in the forefront at the present time because, no doubt, of the peculiar economic conditions prevailing, the pendency of investigations and the inquisitorial mood of legislators, and the endeavor to make government ownership a political issue.

Present agitation assumes the nature of opposite extremes, highly centralized regulation on the one hand and highly decentralized regulation on the other. The one extreme involves forfeiture of state rights and the other a waiver of them.

CENTRALIZED REGULATION

The question of federal versus state regulation of our public utilities is not one for legal determination. The respective powers are understood. The question is entirely one of public policy. The states cannot rely upon the protection of any federal constitutional law for a preservation of their present power of regulation. They can determine by the will of a majority of them, through their members in Congress, whether to maintain or forfeit those powers. The power of public opinion alone can enhance or stay the progress toward a greater centralization of government.

Mere existence of holding or management companies does not of itself constitute a need for federal regulation of public utilities. The states have powers of regulation to determine the value of the properties of public utilities, fix their rates, specify the standard and quality of service and provide for the classification of their accounts. State regulatory authorities would seem to be possessed of adequate power for regulation of the subsidiary companies of holding companies so as to protect the users of service. Even though contractual relations between a holding company and its subsidiary companies may not be subject to abrogation or modification by compulsory action on the part of the state regulatory authorities, nevertheless in determining questions of value or rates it is possible for such regulatory bodies to do indirectly what cannot be done directly in making the conditions of a contract conform with propriety and reasonableness to the necessity and to the reasonable value of the service supplied by a holding or management company to the users of the service of its subsidiary companies.

Best assurance of the continuance of able state regulation lies in the maintenance of satisfactory co-operation among the regulatory authorities of the states in matters of interstate concern. It might be desirable and effective to have the Federal Power Commission act in cases wherein problems of interstate concern cannot be determined in agreement among the states affected. These problems are quite certain to arise from time to time and some satisfactory means will have to be used to meet them. The commission would be in the nature of a board of appeal. The states would not need to surrender their rights. They would merely ask for the intervention of a presumably impartial body to adjust their differences.

Those who wish to preserve the rights of the states in the regulation of public utilities will need to be vigilant in seeing to it that an effective curb is maintained upon the powers of this commission. A gradual increase in its powers could ultimately deprive the states of practically all of their existing powers. Any consent upon the part of the states to require that joint action must be made effective by action of the commission, even though the states concerned may be in agreement, or any power to act on its own motion because of no action by the states, would be the beginning of a real invasion of state rights.

Public utilities need not be so particularly concerned about the form of regulation. Their real concern is that the complexities and burdens of dual regulation may be avoided. Any duplication of regulatory powers is wasteful alike to government and to the industry regulated. Furthermore, dual regulation makes conflicts possible and these conflicts make regulation less effective. The more simple and direct the processes of regulation can be made the more effective will it be in its results.

There has been considerable agitation in Oregon for the abolishment of the public service commission and a reversion to "home rule" or regulation by the municipalities. Election results presage its becoming an issue at the forthcoming session of the legislature. Similar agitation has taken place in other states of the union.

DECENTRALIZED REGULATION

The attempt to restore municipal regulation is attributable to some dissatisfaction with state regulation. However, it is significant that among those who seek to do away with state regulation are most, if not all, of those who most volubly and persistently espouse the cause of government ownership, and who perhaps see in the ultimate chaos of such a form of regulation an opportunity to further their purpose.

Repeal of state regulation necessarily precludes that whatever regulation is to be done must be provided by the legislature or the municipalities.

Obviously, a legislative body is not qualified to regulate effectively and fairly. It has neither expert personnel nor the time to make the necessary investigation and analysis of the facts upon which to predicate regulatory measures. Maximum rates arbitrarily provided are untenable if unsupported by facts. Certainly, questions of valuation cannot be determined by findings of fact. The fact that its members must give consideration to many legislative proposals of a diverse nature makes it impossible to give much of the time of a legislative session to so important and vital a function as regulation. It would be difficult to act impartially in resisting the partisan demands of constituents and the urgency of political expediency. Politics unavoidably become a factor in

regulation with the result that emotions and selfish motives rather than reason and facts determine in considerable measure the nature of regulatory policies and practices.

Physical and economic characteristics in both the production and distribution of public utility service no longer limit the service of a single company to a single municipality, but rather to many municipalities and rural communities, with a physical interconnection of transmission systems and a common dependency upon production facilities. The operations are inter-municipal; consequently, regulation must be inter-dependent. There must be some measure of co-operation among municipalities.

Let it be assumed that municipalities act co-operatively in an expert determination of facts. The facts once obtained must be interpreted and applied to each municipality and community. Each in a spirit of economic rivalry competes for advantage. There might be as many interpretations of the facts as there were municipalities. The resources of each municipality and the ability and ingenuity of its representatives would probably determine the advantage. What the rural communities would get would depend upon what the urban communities would take. Once the rate base for each municipality were determined, the rate structure might be calculated not always upon what would produce the greatest economic good, but what would best satisfy the public clamor. Rate schedules would be equitable and scientific to the extent that political expediency did not govern. Obviously there likely would be partial and unfair regulation.

While there would be opportunity for interested representation, there would be little opportunity for disinterested decisions. The measure of return would be scarcely more than enough to avoid confiscation. The investment of capital would be discouraged. Community growth would be retarded. Rate discriminations would be not only possible but probable. A constant status of litigation would be necessary to preserve legitimate investment in property and an equitable adjustment of rights. A chaotic condition would be existent with the variability of public sentiment and possible strife among municipalities in applying values and fixing rates.

Facts About Regulation Should Be Made Known

It is reasonable to presume that the attacks made upon our state commissions and our federal courts because of their decisions are motivated and exerted, in the main, by forces who seek to discredit regulation and thereby encourage government ownership.

Any allegations and impugnments made against state commissions and the federal courts ought to be made the subject of honest inquiry and the findings of fact given the fullest publicity. The acts of state commissions are of public record. The facts, no doubt, would disclose that the preponderance of orders and decisions by commissions had been favorable to the public; that the tendency had been to be restrictive rather than liberal with the public utilities; that commissions were disposed to reduce rates and reluctant to increase them; that the trend in rates had been downward and not upward; that appeals to the federal courts had been few by comparison with the number of decisions made by the commissions; that such appeals had been made not to maintain values or rates for purposes of extortion, but to avoid actual confiscation of property.

There are people who do not favor government ownership but who have been made skeptical of the effectiveness of regulation. They honestly wish to see it effective. It is important that this skepticism should be eliminated by disclosures of facts to substantiate the need for any revisions in any of the public utility statutes of the states to make regulation more effective.

Those who believe in a preservation of private initiative and enterprise in the conduct of our public utilities and the public utilities themselves are confronted with an extensive campaign of opposition and detraction. Public confidence in regulation cannot be undermined and ultimately destroyed without a substitution for it of government ownership. Consequently, those who would preserve private initiative and enterprise are in accord with members of the public utility industry in the opinion that the integrity and efficiency of regulation must be preserved and maintained.

The present depression in business is a factor in promoting agitation. The will to agitate is always manifest when conditions are subnormal. It does not matter whether that agitation is justifiable or not. Discontent and restlessness are abroad in the land. A depressed and critical psychology is existent. A return of normal conditions will allay this agitation, but in the meantime a more distrustful and skeptical psychology will have been built up that will be difficult to dissipate and disillusion. Much of the confidence built up will have to be rebuilt. Thus the periodical integration and disintegration of confidence seems to be an inevitable circumstance of economic changes.

▼ ▼ ▼

Bureau Reorganized To Create New Business

Co-operative Commercial Development Program for all Branches of the Industry Outlined to Translate Into Action the Committee Work of Associations and Research Organizations

ONE gap existing between the work of associations engaged in the study of theories and policies and the practical application of the findings of such organizations for the commercial advancement of the industry bids fair to be closed with the reorganization of the California Electrical Bureau which has just been completed. Begun over a year ago as a concept for the more effective use of the facilities of the industry by the late Charles T. Hutchinson, then chairman of the advisory committee of the California Electrical Bureau, the work has been carried to completion by a special committee appointed by W. L. Frost, present chairman of the Bureau.

This committee was headed by R. M. Alvord, representing the manufacturers' viewpoint, assisted by R. E. Fisher, representing the central station viewpoint, and D. E. Harris, representing the wholesalers' viewpoint.

Clyde L. Chamblin has been appointed a member of the executive committee to represent the contractor-dealer interests.

Details of the plan are explained in the official announcement reprinted in the following, and the relationship of the various departments can be seen by an examination of the chart reproduced on page 7. But it is the purpose back of the mechanics of the new Pacific Coast Electrical Bureau, as it now is called, outlined below, that is of particular significance to everyone in the electrical industry.

The program is described best as a co-operative business development program. With its employment it is planned that all of the best commercial and business activities in the electrical industry in California be co-ordinated. It will be able to put into actual effective use the excellent suggestions and data resulting from the committee work of such organizations as the Pacific Coast Electrical Association, the Committee on the Relation of Electricity to Agriculture, and other research and study organizations.

For the co-operative advertising programs of the industry, its radio broadcasting work and such other develments as require a broad application and impartial industry sponsorship, this new organization becomes the logical operating center. Indeed, it is felt by all who have analyzed the plan carefully and thoroughly that it offers a concentration of hitherto unrelated activities, an efficient administration of all industry commercial development, and the impartial and yet interested viewpoint necessary to focus the efforts of all branches of the industry upon common objectives.

The plan in detail follows:

Outline of Organization Plan

The prime objective constantly in the minds of the committee drafting the reorganization of the Bureau and its co-ordination with the Pacific Coast Electrical Association was the importance of bringing the greatest possible number of electrical people into close personal contact with the promotional work of the industry. It is through such work that an industry consciousness is best developed and maintained. Also it is such personal contact in a common cause and with a community of interest which develops and maintains harmonious relations between individuals and groups. With this thought in mind, but also realizing the importance of frequent meetings without involving a great deal of traveling expense, the comprehensive organization plan illustrated in the accompanying chart was developed.

Regional Set-Up

Under this program the state will be divided into three regions,—northern, central and southern. Each will be under the direction and supervision of a regional chairman who will be a member of the board of directors of the Bureau.

Under the direction of the regional chairman there will be certain specific committees charged with the responsibility of promoting the industry program which is most closely affiliated with the regular duties of the committee members; for example, Red Seal wiring, lighting, industrial electrification, etc.

Assisting each of these regional chairmen and their several regional committees to obtain the greatest results from the industry programs there will be a field representative who will be a full-time paid employee of the Bureau.

State Set-Up

In addition to the regional committees there will be a state committee for each specific activity to be undertaken, each state committee to be under the chairmanship of a member of the board of directors. The state committees will be responsible for the development of all the working details and the preparation of all material necessary to the success of their respective projects. The bureau headquarters staff will be available to assist the state committees in their endeavors.

Relation Between State Chairmen and Regional Directors

Each state chairman will be responsible for his respective activity in its state-wide aspects; i.e., the preparation of plans and material and their dissemination to the several corresponding regional committees; whereas each regional director will be responsible for the actual field accomplishment of all of the industry programs within his region.

Actual practical working out of this plan will be that at a meeting of the board of directors of the Bureau each state chairman will be called upon for a report of what has been done by his specific committee and each regional director will report upon the actual field accomplishments of all activities within his region.

Relations With the P.C.E.A.

Within the Commercial Section and the Advertising and Publicity Section of the Pacific Coast Electrical Association there are a number of committees which have each year been working upon the development of comprehensive programs which would be of great benefit to the industry if promoted in a co-operative way. Under former practices these have published at the close of each year their annual reports and have failed to produce benefits because of lack of the means through which to exploit them.

Under the new organization plan the reports and recommendations of the various Pacific Coast Electrical Association committees will be passed on to the corresponding state committee of the Bureau, and if accepted by the state chairman and approved by the board of directors will find the organization, as outlined above and illustrated on the chart, established and prepared to put these programs immediately into effect.

The same opportunities and advantages are available to the various subcommittees of the Committee on the Relation of Electricity to Agriculture through the agricultural electrification committee of the Bureau.

Future Possibilities

A study of the organization chart will reveal the facility with which this organization can be expanded to meet any conditions which may arise in the future. For example, should there be a territorial expansion this could readily be absorbed into the organization through the addition of a new region, or regions, and the enlargement of the board of directors to include the new regional directors which thus come into being.

Similarly, if the future should create the need for the co-operative promotion of new industry programs these can readily be drafted into the organization by the addition of a new state committee and corresponding regional committees.

Summary

All of the men of all branches of the industry within the comparatively limited area of the regions under this program will be brought together in the furtherance of the particular industry program in which they have a community of interest. The natural result of this should be an improvement in business conditions and the development of a spirit of unity and harmony in industry relationship.

Organization chart depicting the relationship of all committees to the field staff and to the guiding organizations. The strength of the plan lies in the fact that the same men who act on the guiding committees are in most cases charged with the operation of the program in their own home region. Also regional activities are co-ordinated by regional executive committees.

Engineering

Shuffleton Plant Emphasizes Steam In the Northwest

Modern Steam Plant Supplements Hydro System by Providing Stand-by Service With Additional Capacity for Intermediate Load Growth

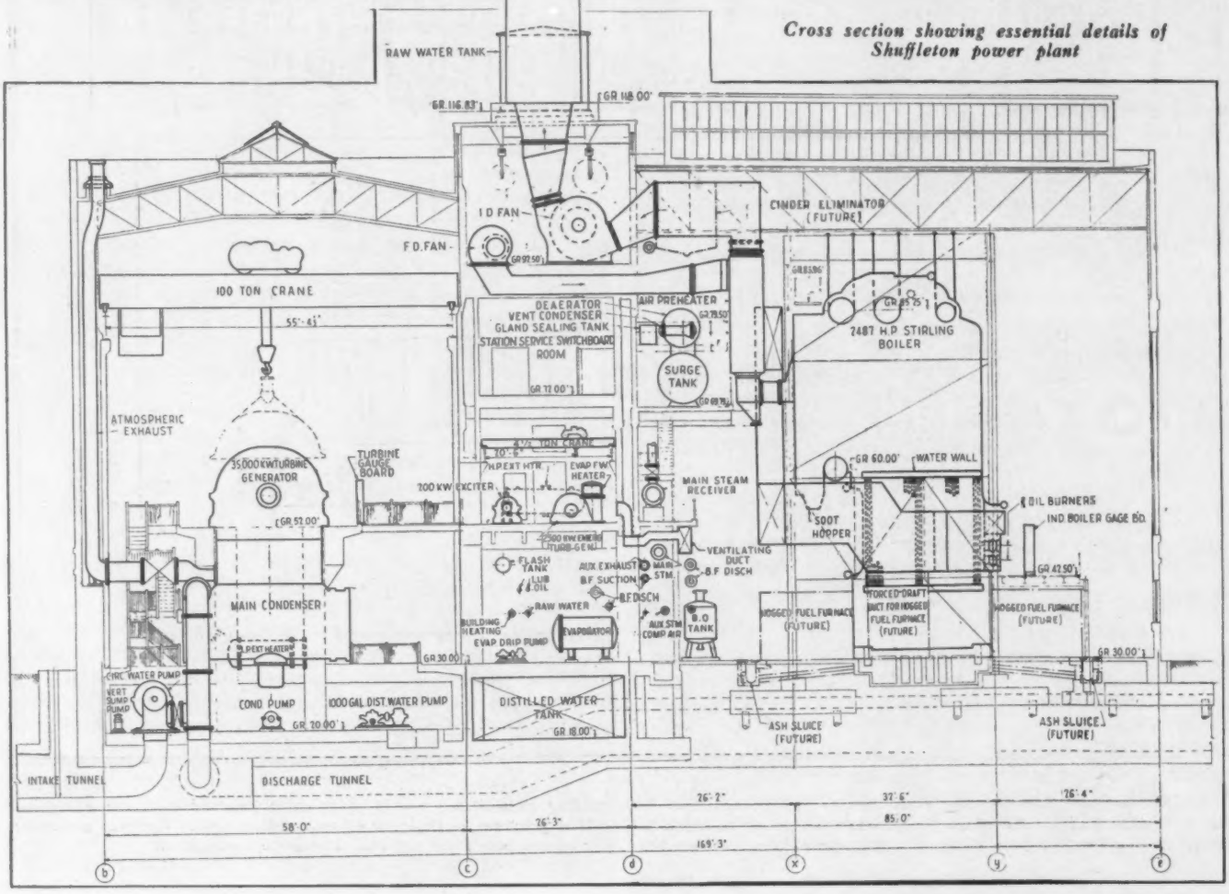
By **W. D. SHANNON**
General Superintendent of Construction, Stone & Webster Engineering Corporation, Seattle

ALTHOUGH hydro-electric production still predominates on the system of the Puget Sound Power & Light Company, the most recent addition is the 87,500-kva. Shuffleton steam-electric generating station. Conceived originally as a purely standby plant of 43,750-kva. capacity, the relatively poor water conditions of the past two years, as far as hydro production is concerned, emphasized the desirability of increasing the steam-electric generating capacity of the system. Hence, when the first unit went into service on Aug. 28, 1929, the second unit was under construction and followed into service April 7, 1930.

Always of appreciable interest in connection with the advent of major fuel-burning plants on nominally hydro systems is the economy consideration underlying such a step. Fundamentally, of course, the answer is to build whatever plant will deliver kilowatt-hours to the load center at the least cost. Just why steam answers in the Pacific Northwest where exists the bulk of the undeveloped water power of the nation, may be a question in the minds of some. This question answers itself, however, when it is remembered that all of the economically feasible and relatively close-in hydro sites capable of development in assimilable units (up to, say, 25,000 kva.) already have been developed. Remaining sites are much farther from present power markets, require long high-tension transmission lines, and require such costly hydraulic development that they cannot be brought into production economically except in units that are a little too large (from 60,000 to 100,000 kva.) for present markets to absorb within a reasonable time. With a steam station of sufficient capacity to meet emergencies, however, and to meet intermediate load growth, further hydro development will become feasible, but not to the exclusion of steam stations.

Shuffleton steam-electric station was named as a tribute to Samuel L. Shuffleton, for years a prominent figure in the development of the power resources of the

Cross section showing essential details of Shuffleton power plant



Southeastern elevation showing two 50,000-kva., 13.8/55-kv. main transformer banks and two station service banks with associated bus structures. The 55-kv. switch rack and the control house are just to the left

West, and recently retired vice-president of the Stone & Webster Engineering Corporation. Its position at the extreme southern tip of Lake Washington, fifteen miles from the center of Seattle, is strategic from the standpoint of fuel delivery, water supply, and power transmission. At present the plant is burning fuel oil, but it has been designed and laid out to accommodate the construction of Dutch-oven furnaces for the combustion of hogged fuel, or for the addition of ash pits, and the equipment necessary for the burning of powdered low-grade coal. It is even within the realms of possibility that natural gas might one day find its way to Puget Sound in such quantities and at such price as to make it an attractive fuel. Thus, future possibilities have been cared for as far as possible.

Structures occupying the 69.57-acre plant site at present include the 55-kv. switch structure where emanate the three present 55-kv. outgoing circuits, the transformer and generator terminal structure, a switchboard and control building, the main power house, oil pumping houses, two 30,000-bbl. oil storage tanks, two 1,000-bbl. service stanks, and a wharf to accommodate fuel delivery direct by boat.

Fuel oil is received in tankers and delivered to the storage tanks through a 10-in. pipe line 1,100 ft. long. The oil is heated as required on ship board and pumped by the ship's pumps. A removable, localized steam heater is inserted through the wall of each tank to concentrate and limit the heating to the oil as it passes through the suction pipe line to the service pumps. From the service tanks fuel flows by gravity to the bank of three 80-g.p.m and one 40-g.p.m. motor-driven screw pumps which operate at a discharge pressure of 250 lb. A protective device interrupts the pump motor circuits in the event that oil pressure drops to 125 lb., thus caring for possible line breaks. Fuel oil temperature is maintained at from 150 to 250 deg. F. by thermostatically controlled steam heaters.

Three 2,500-hp. boilers of the Stirling type, designed to have a maximum continuous steaming capacity of at least 330,000 lb. per hour at 450-lb. pressure, and equipped with convection-type superheaters to raise the total steam temperature to 730 deg. F., are installed to serve the two generating units. The entire boiler structure is suspended from a structural steel support which is entirely separate from the building frame.

Two boilers at maximum capacity will provide steam for a load of about 30,000 kw. on each of the two units, while for a capacity of 42,000 kw. on each of the two units three boilers steaming at about 300,000 lb. per hour are required. Normal operating pressure at the superheater outlet is 418 lb.

Furnaces are equipped with water walls having a total effective heating surface of about 2,100 sq.ft., or between 8 and 9 per cent of the 25,000 sq.ft. of effective heating surface in each boiler.

For each boiler the forced-draft fan set comprises two fans mounted on a single shaft with two constant-speed driving motors mounted one on each end of the shaft. These motors operate at different speeds and are subject to automatic combustion control equipment, or they may be controlled by hand. Movable radial vanes on the double inlets are motor operated and also subject to automatic or manual control.

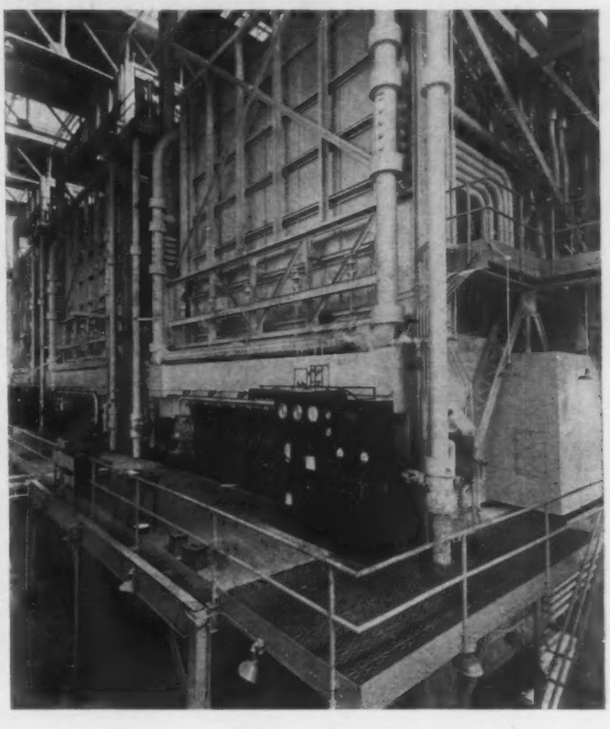
Induced draft fan sets are similar in arrangement. They discharge through ducts directly into 8 x 60-ft. reinforced concrete, brick-lined stacks which are carried on the building frame.

Air preheaters on each furnace are designed to handle the 367,000 lb. of air per hour that is required for the steaming rate of 330,000 lb. per hour when burning oil. Under these conditions, entering air at 80 deg. F. will be heated to 423 deg. F., and the outgoing gases cooled from 890 deg. F. to 599 deg. F., or an average transfer rate of 1,620 B.t.u. per sq.ft. per hour.

Regulation of the amount of air intake and exhaust gases is effected by remote push-button control of the induced-draft fans and the automatic variation of the forced-draft fan to suit the pressure in the furnace due to the change in the induced draft. This system is operated electrically and may be expanded into a comprehensive automatic control which will regulate also the induced draft for the amount of furnace gas to be removed.

In the main steam piping system, the most interesting feature is the general design in connection with the unit system of development provided for and contemplated for possible future development of the plant. Equipment

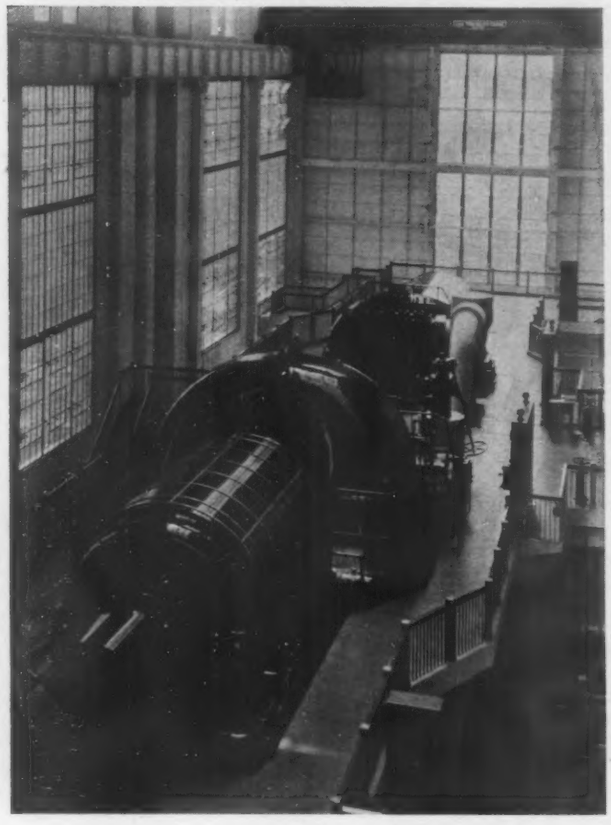
In the boiler room provision has been made for the addition of Dutch-oven hogged fuel furnaces or ash-handling equipment for the burning of powdered low-grade coal



Double induced-draft fans (left) and similar forced-draft fans (right) on a floor above the boilers

throughout the plant is so placed that maximum piping simplicity might be realized. The design is such that not more than the total steam from one boiler may be interchanged for use in any other than the immediately associated unit. This arrangement permits one boiler out of four to be taken down for repairs, leaving the remaining three boilers to supply at nominal overload all the steam required for two generating units, at 42,000 kw. each.

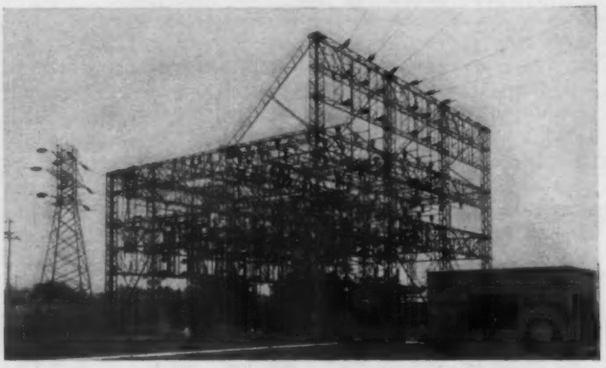
Elevated turbine floor with two 43,750-kva. generating units and associated control panels. Small platform provides maximum natural light and ventilation for the lower equipment levels



Each of the two main generating units is rated at 43,750 kva., or 35,000 kw. at 80 per cent power factor, 13,800 volts, three-phase, 1,800 r.p.m. Main generators are Y-connected so that they may be operated with the neutral either grounded or ungrounded. The turbines are single-cylinder impulse-type units arranged for three-point extraction. The No. 1 unit is a 17-stage turbine, while the No. 2 unit is a 15-stage machine. Extraction on the former is at the 7th, 11th, and 14th stages, while on the latter it is at the 3rd, 8th, and 12th stages. Both units are practically identical in operating characteristics. The water rate for a load of 35,000 kw. and with 1-in. mercury absolute back pressure is 9.11 lb. per kw.-hr. when no steam is being extracted, and 10.51 lb. per kw.-hr. with full extraction.

One of the unique features of the plant is the arrangement provided to accommodate the operation of the generators as synchronous condensers for power factor correction when they are not needed as generators. Each unit is provided with four bearings and is fitted with a coupling which may be separated to isolate the generator from the turbine. To start the machine under these conditions a special bearing-oil system is provided which supplies 1,000 lb. to the bearings to float the shaft for the starting period. For starting purposes, either the other generating unit or a line from a nearby hydro plant must be available, in the former case the two generators being switched together with the proper field excitation and brought up to speed together. This is no particular hardship since, when power-factor correction is needed, the steam plant will be idling. Otherwise certain of the hydro plants supply the corrective kva.

Generator cooling is accomplished through a totally enclosed recirculating air cooling apparatus which is equipped with automatic carbon-dioxide fire fighting equipment. Excitation normally is furnished by direct-connected exciter and pilot exciter combinations on each



Switch rack for the 55-kv. lines. Two lines come directly from the main transformer banks shown in previous picture and two lines go directly to Renton switching station with a third as a temporary tie with Beverly Park switching center

main unit. For emergency purposes a dual-drive separate exciter is provided.

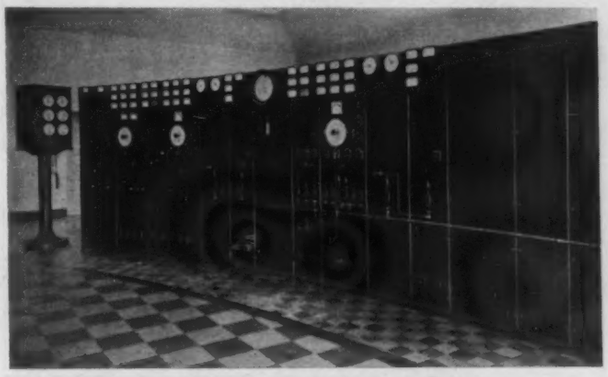
A 3,600-r.p.m., 3,125-kva. emergency house turbine-generating unit is provided for station auxiliary power supply. This unit operates non-condensing and is designed to come up to full speed within 12 sec. and up to full voltage within 15 sec. after its starting button is operated. When up to speed it is synchronized manually.

Surface-type condensers are provided for each of the main units, that for No. 1 having 40,000 sq.ft. of cooling surface, while that for No. 2 has 28,000 sq.ft. No. 1 condenser is designed to handle 390,000 lb. of steam with 60,000 gal. per min. of 55-deg. circulating water to pro-

duce an absolute pressure of 0.94 in. mercury. The only advantage of the larger condenser is to obtain higher relative vacuum when the temperature of the lake water used for cooling is relatively high—60 deg. F. or more. Such condition exists for only a few months of the year and during such periods it is unlikely that both units will be needed. Under normal conditions of condenser water the small gain in net generator output is more than offset by the power requirements of the auxiliaries required by the larger condenser.

No. 2 condenser is designed to handle 390,000 lb. of steam with 48,000 g.p.m. of 55-deg. circulating water with vacuum of 1.14 in. mercury.

Condensate from the condenser hotwells is heated to a maximum of about 360 deg. F by a group of three extraction heaters using bled steam as previously mentioned. The feed-water heating system for each turbine-generator may be considered in two parts with respect to the pumping arrangement. In the first part condensate is drawn from the main condenser hotwells by the condensate pumps which discharge through the low-pressure heater to the intermediate or deaerating heater.



Main switchboard in the control house, with the related terminal boards in cabinets on the floor below

In the second part the boiler feed pumps draw from a surge tank immediately below and fed by the deaerator, and discharge through the high-pressure heater and feed water regulating valves into the boilers. For each turbine unit there is an evaporator having a capacity of 14,500 gal. per hour, equivalent to about 3 per cent of the maximum steam supplied. A special motor-operated set of valves controlled from a board conveniently located on the ground floor of the turbine room provides a dependable means of supplying or withdrawing water from the boiler feed system.

The unit system is adhered to on the electrical side of the power house as well as on the steam side. Each generator is connected directly to the low tension side of its own 50,000-kva., 13.8/55-kv. transformer bank, connections from the high sides of which run separately to the 55-kv. switching structure. Normally, each of the generators operates directly on a 55-kv. tie line which feeds directly from the switching structure to the Renton Switching Station, 3.5 miles away, where interconnections from the system converge. A tie also may be made from the 55-kv. generator transformer lead to the 55-kv. bus from which runs a 55-kv. line to Beverly Park substation, the terminus of the Baker River lines and the proposed terminus of the Rock Island lines.

All cables leading from the generators to the outdoor transformer structure are carried in an elevated location, rather than in underground conduit, as so often is done. This open construction of generator leads not only was more economical, but makes them very much easier to get at in case of possible maintenance or repairs.

Auxiliary switch bay showing the 460-volt bus and switches at the right; the 2.3-kv. truck-type board at the left. Beyond the 460-volt equipment may be seen a typical 460-volt control panel group

From the building to the transformer structure, the leads are protected from the elements by a concrete canopy which extends from the building to the rack, including the terminal section of the rack. This canopy is open on the under side. Generator cables are carried on 15-kv. pillar-type bus supports inside the building, while 23-kv. supports are used outside under the canopy.

The unit design of the plant is carried to the electric power supply for the various auxiliary equipment. There are a 2.3-kv. bus and a 460-volt bus for the auxiliaries of each main generating unit, and also an independent 115/230-volt lighting supply for the particular section of the building occupied by the equipment for each unit.

Power supply for auxiliaries normally comes from two station service transformer banks connected to the leads from each generator at the low side of the generator transformer bank. This connection makes it possible to feed either directly from the main generators, or from the system back through the 13.8/55-kv. generator transformers.

Normal supply for plant lighting, again divided into sections along the unit plan, is from a single-phase transformer fed from the unit 2.3-kv. bus and equipped with an induction voltage regulator. The unit lighting transformers feed to corresponding unit lighting switchboards located in the station service switchboard room, whence circuits are distributed to the several lighting cabinets throughout the plant.

Operation of the plant is centered in the main switchboard room which is situated in the operating building some 200 ft. from the power house building. This building contains space sufficient to accommodate the control boards for three units, and the south wall is of temporary nature so that the building may be extended as required.

In the main, the arrangement of panels on the main switchboard is in conformity with the unit idea, and in general, with the actual relative location of the main equipment in the plant proper. Control for all of the station auxiliary and supply circuits is concentrated in the main switchboard room.

Relays are provided for separate differential protection of each of the main generators and each of the main generator transformers, and for the 13.8/2.3-kv. station service transformers. On the generators the relays trip the main throttle valve, automatically trip the carbon-dioxide fire-fighting system, open the line side and the neutral oil circuit breakers, and trip the field switch.

Reactive Kva. Metering—V

Use of Phase-Shifting Reactor in Connection With the Metering of Reactive Kva. on Three-Phase Three-Wire Circuits

By E. C. GOODALE, Tacoma Washington

ANOTHER method of metering reactive kva. on three-phase three-wire circuits involves the use of a reactor in the common lead from the potential transformer secondaries, thus making a Y-connection of the reactor and the two reactive meter potential coils, as illustrated in Fig. 15. Impedance of the reactor is made equal to that of the voltage coils so that the Y-load is balanced and the neutral point, m, occupies a vector position at the center of the vector triangle formed by the vectors representing the potential transformer secondary voltages. This makes the voltage, e_1, across the reactor equal numerically to the voltage across each potential coil of the reactive meter, and serves to shift the phase relations of these voltages so that, when connected as in Fig. 15, the voltage applied to the reactive meter element will lag 90 deg. behind that applied to the corresponding active meter (wattmeter) element. Effects of the reactor are shown in the vector polygon of Fig 16(C).

As a result of the choking effect of the reactor the numerical values of these reactive meter voltages are only 57.7 per cent of those applied to the wattmeter (or watthour meter) potential elements, assuming balanced line voltages and perfect potential transformers. Consequently, special reactive meters are designed for this service, differing in that their normal rated voltage is but 57.7 per cent of the voltage rating of the corresponding wattmeter (or watthour meter). Accordingly, to put the reactive meter and the wattmeter on the same basis as regards registration, it will be necessary to multiply the registration of the reactive meter by 1/.577 or 1.732. This correction factor is taken care of automatically in the specially designed meter.

Assuming perfect meters and transformers, reactive meters connected in accordance with Fig. 15 will register correctly as long as the line voltages remain balanced, regardless of the unbalance of the loads. This is the same as was true with the auto-transformer scheme of three-phase three-wire reactive metering discussed in the previous article. Errors resulting from unbalanced line voltages also will be the same as those encountered in the auto-transformer type of reactive metering connection.

Figure 16(A) shows the unity-power-factor vector relations between voltages and currents in the two wattmeter (or watthour meter) elements for a balanced load taking 300 amp. per wire at 10 kv., with a potential transformer ratio of 100/1 and a current transformer

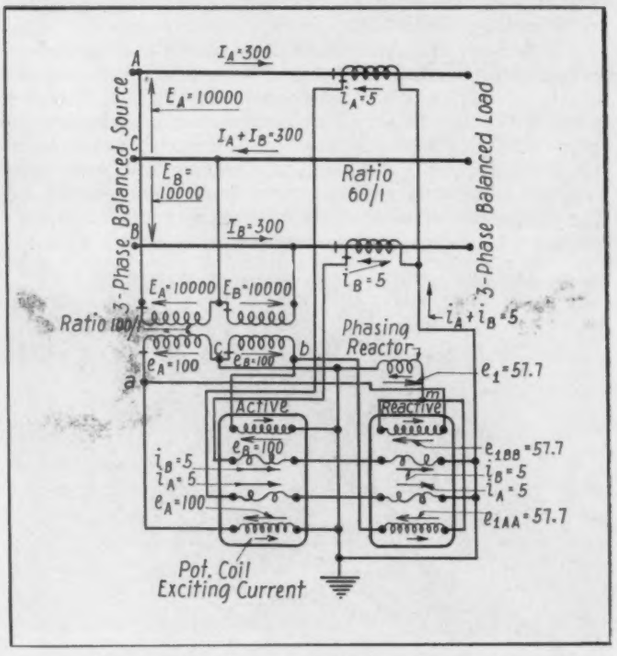
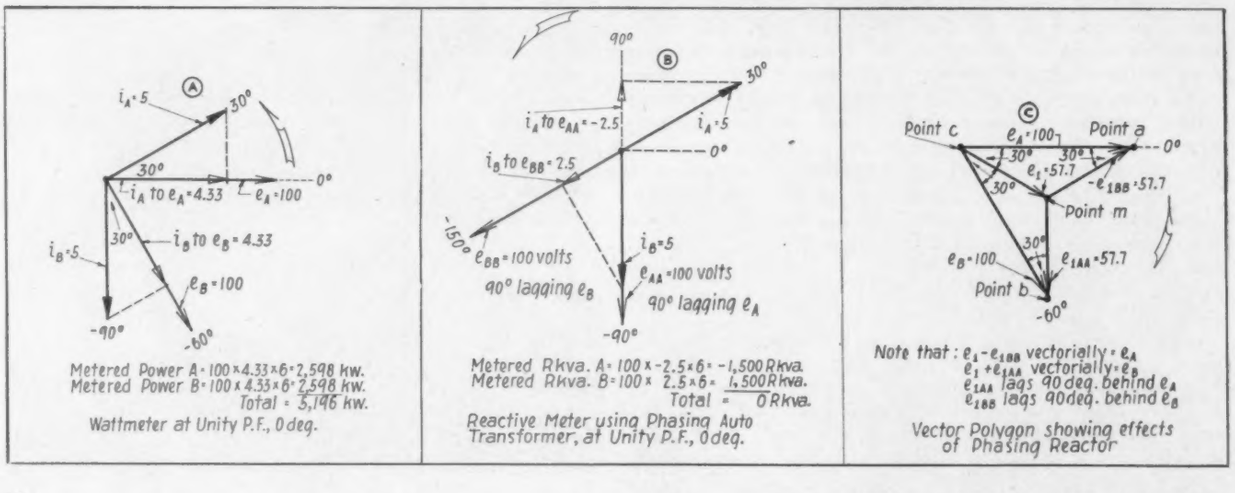


Fig. 15. Diagram of connections involved in metering kw. and reactive kva. on a three-phase three-wire circuit, utilizing a reactor to shift the voltage phase relations in the reactive meter

ratio of 60/1, and hence a total transformation ratio of 6,000/1. The power component of current i_A with respect to voltage e_A is 4.33 amp., determined as explained in previous articles. And the power registered on the

Fig. 16. Vectorial comparison of the phase relations between some of the important quantities involved in the connection diagram of Fig. 15


Metered Power A = 100 x 4.33 x 6 = 2,598 kw.
Metered Power B = 100 x 4.33 x 6 = 2,598 kw.
Total = 5,196 kw.
Wattmeter at Unity P.F., 0 deg.
Metered Rkva. A = 100 x -2.5 x 6 = -1,500 Rkva.
Metered Rkva. B = 100 x 2.5 x 6 = 1,500 Rkva.
Total = 0 Rkva.
Reactive Meter using Phasing Auto Transformer, at Unity P.F., 0 deg.
Point c
Point a
Point m
Point b
Note that: $e_1 - e_{1BB}$ vectorially = e_A
$e_1 + e_{1AA}$ vectorially = e_B
e_{1AA} lags 90 deg. behind e_A
e_{1BB} lags 90 deg. behind e_B
Vector Polygon showing effects of Phasing Reactor

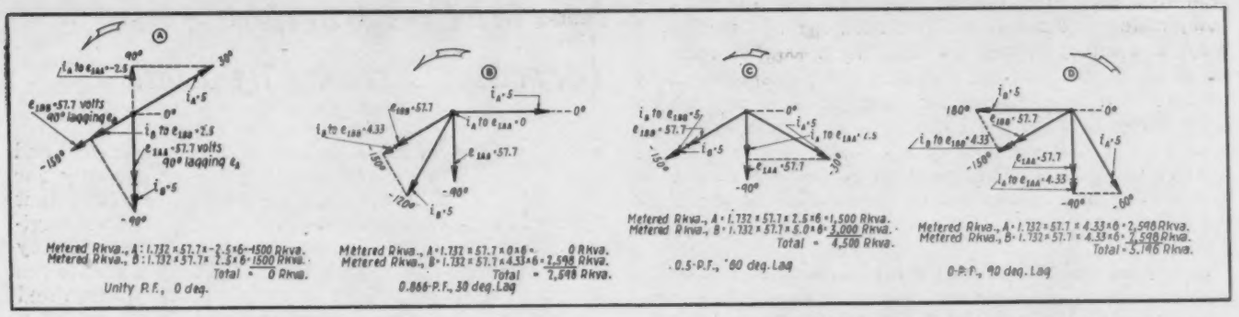

Metered Rkva., A: 1.732 × 57.7 × 2.5 × 6 = 1500 Rkva.
Metered Rkva., B: 1.732 × 57.7 × 2.5 × 6 = 1500 Rkva.
Total = 0 Rkva.
Unity P.F., 0 deg.
Metered Rkva., A: 1.732 × 57.7 × 0 × 6 = 0 Rkva.
Metered Rkva., B: 1.732 × 57.7 × 4.33 × 6 = 2,598 Rkva.
Total = 2,598 Rkva.
0.866 P.F., 30 deg. Lag
Metered Rkva., A: 1.732 × 57.7 × 2.5 × 6 = 1,500 Rkva.
Metered Rkva., B: 1.732 × 57.7 × 5.0 × 6 = 3,000 Rkva.
Total = 4,500 Rkva.
0.5 P.F., 60 deg. Lag
Metered Rkva., A: 1.732 × 57.7 × 4.33 × 6 = 2,598 Rkva.
Metered Rkva., B: 1.732 × 57.7 × 4.33 × 6 = 2,598 Rkva.
Total = 5,196 Rkva.
0 P.F., 90 deg. Lag

Fig. 17. Vectorial representation of phase relations occurring under various power-factor conditions in the reacto-type reactive meter circuit of Fig. 15

lower element of the wattmeter is

$$\frac{100 \times 4.33 \times 6{,}000}{1{,}000} = 2{,}598 \text{ kw.}$$

Similarly, the power component of i_B with respect to e_B is 4.33 amp. and the power registered on the upper element also is

$$\frac{100 \times 4.33 \times 6{,}000}{1{,}000} = 2{,}598 \text{ kw.}$$

The total power, therefore, would be $2{,}598 + 2{,}598 = 5{,}196$ kw.

True power passing over the line under these balanced load conditions is determined by the well known formula, 1.732 × line volts × line amp. × load power factor

$$= \frac{1.732 \times 10{,}000 \times 300 \times 1.0}{1{,}000} = 5{,}196 \text{ kw.}$$

In the previous article it was shown that the registration of the wattmeter decreased as the load current lagged more and more while the registration of the reactive meter (using phasing auto-transformer) increased. The same is true of the reactive meter using a phasing reactor in place of the auto-transformer. In either case voltages derived for the reactive meter lag the corresponding wattmeter voltages by 90 deg. Fig. 16(B) shows the vector relations between voltage and current in the two elements of the auto-transformer type of reactive meter, with the load currents balanced and at unity power factor, 0 deg. Voltage e_{AA} is 90 deg. lagging e_A and e_{BB} lags e_B by 90 deg.

Voltages for the reactor-type meter are derived as shown in the vector polygon of Fig. 16(C). Voltage e_A divides vectorially into e_1 across the reactor, minus (vectorially) e_{1BB}, the voltage applied to the B element of the reactor-type meter. Similarly e_B divides (vectorially) into e_1, across the reactor plus (vectorially) e_{1AA}, the voltage applied to the A element.

Phase relations between voltages and currents in the reactor-type reactive meter for unity power factor, 0 deg., are shown in Fig. 17(A). It may be noted that the values of the voltages are but 57.7 per cent of the voltages in Fig. 16(B), but that they lie at the same phase positions with respect to their currents.

To check the registration of such a reactive meter it is necessary to divide the power registered in each element by 0.577 or multiply by 1.732 in order to get the results on the same basis as those in the auto-transformer type of reactive meter or in the wattmeter. In other words, if the design of the meter did not automatically take care of this correction factor it would be necessary to use a multiplying constant of 1.732 to secure the true registration of the reactive kva. of the circuit. Consequently, in checking vectorially it is necessary to use this mutiplying constant of 1.732.

At 0 deg., balanced load, the power factor is 1.0, the reactive factor 0.

The true Rkva.:

$$\frac{1.732 \times 10{,}000 \times 300 \times 0}{1{,}000} = 0 \text{ Rkva.}$$

Metered Rkva., element A:

$$1.732 \times 57.7 \times -2.5 \times 6 = 1{,}500 \text{ Rkva.}$$

Metered Rkva., element B:

$$1.732 \times 57.7 \times 2.5 \times 6 = 1{,}500 \text{ Rkva.}$$

Total ..... 0 Rkva.

At 30 deg. lag the power factor = 0.866 and the reactive factor = 0.5. See Fig. 17(B).

True Rkva.:

$$\frac{1.732 \times 10{,}000 \times 300 \times 0.5}{1{,}000} = 2{,}598 \text{ Rkva.}$$

Metered Rkva. A:

$$1.732 \times 57.7 \times 0 \times 6 = 0 \text{ Rkva.}$$

Metered Rkva. B:

$$1.732 \times 57.7 \times 4.33 \times 6 = 2{,}598 \text{ Rkva.}$$

Total ..... = 2,598 Rkva.

At 60 deg. lag the power factor = 0.5 and the reactive factor = 0.866. See Fig. 17(C).

True Rkva.:

$$\frac{1.732 \times 10{,}000 \times 300 \times 0.866}{1{,}000} = 4{,}500 \text{ Rkva.}$$

Metered Rkva. A:

$$1.732 \times 57.7 \times 2.5 \times 6 = 1{,}500 \text{ Rkva.}$$

Metered Rkva. B:

$$1.732 \times 57.7 \times 5.0 \times 6 = 3{,}000 \text{ Rkva.}$$

Total ..... = 4,500 Rkva.

At 90 deg. lag. the power factor = 0 and the reactive factor = 1.0. See Fig. 17(D).

True Rkva.:

$$\frac{1.732 \times 10{,}000 \times 300 \times 1.0}{1{,}000} = 5{,}196 \text{ Rkva.}$$

Metered Rkva. A:

$$1.732 \times 57.7 \times 4.33 \times 6 = 2{,}598 \text{ Rkva.}$$

Metered Rkva. B:

$$1.732 \times 57.7 \times 4.33 \times 6 = 2{,}598 \text{ Rkva.}$$

Total ..... = 5,196 Rkva.

By comparing the above figures with those of the previous article it will be evident that the reactor method of reactive metering gives the same results as the auto-transformer method.

No attempt has been made in the foregoing dicussion to prove that the vector values of $-e_{1BB}$ and e_{1AA} are as shown in Fig. 16(C). The proof depends upon the solu-

tion of a set of simultaneous equations which would only complicate the discussion if included here. However, it may be seen by inspection that the vector position of point m, on the polygon diagram, the point common to both reactive meter potential elements, naturally should lie midway between the vector tips of e_A and e_B and at such a point that voltages e_1, 1_{1AA}, and $-e_{1AA}$ all will be numerically equal. This position is the one shown in Fig. 16(C) and is the neutral point of a balanced Y-connected circuit consisting of the reactor and the two voltage coils.

It may be well to see how the modification of Kirchoff's law holds here. The voltage from c to a, which, by the "direct route" through the A-transformer secondary is found to be $e_A = 100$ volts, should be the same as will be obtained by traversing from c through the reactor (hence in the same direction as voltage e_1), down through the upper element from left to right (hence opposing e_{1BB}), and thence back to a. That is, e_A should be equal to $e_1 - e_{1BB}$.

Similarly, between points c and b, voltage e_B should be equal to $e_1 + e_{1AA}$. By referring to Fig. 16(C) it may be seen that these two vector additions agree with the diagram, e_A being equal to $e_1 - e_{1BB}$ and e_B equal to $e_1 + e_{1AA}$.

It may be rementioned here that the direction arrows of the potential elements (Fig. 15) are shown opposing the flow of current to permit Kirchoff's law to be checked out graphically. These potential elements are loads, and hence the voltages indicated on them are opposite to the flow of current. (In a source such as the secondary of a transformer the voltage arrow agrees with the current arrow, whereas in a load such as a coil, a resistance, or even the primary of a transformer the voltage arrow is assumed opposite to the direction of current flow, since the induced voltage or "drop" has the effect of bucking the current.)

Kirchoff's law makes it plain that all the potential generated in a source must be used up in the external circuit. Hence if the loads are shown with voltage arrows opposing the flow of current, then in traversing any circuit the voltages picked up in the sources encountered en route will be equal (vectorially) to those "dropped" across the loads and the net rise and fall of potential around the circuit will be zero. If the "drop" happens to be in the same direction as that in which we are progressing it is a "gain" in voltage and will be added vectorially. If opposed to our direction it will be a "loss" and will be vectorially subtracted.

Putting the direction arrows on the connection diagram in this way greatly facilitates checking the connections vectorially by means of Kirchoff's laws. If the direction arrow of the voltage drop across a load were put on the connection diagram in the same direction as the current arrow, or not put on at all, it would not be possible to check Kirchoff's voltage law, or its modification, without remembering in each case whether it were a "drop" (load) or a source, and the original assumption with regard to it. By putting the proper directions on the connection diagram there need be no hesitation about whether to add or subtract the vector on the vector diagram. If in our direction, add it; if opposed, subtract it. In cases where only two or possibly three voltages are encountered in checking for the voltage between two points these rules may seem laborious, but they more than make up for seeming complications when the connections are at all complicated, as for example in radio and control circuits.

Vector addition and subtraction was discussed in detail in the March, 1927, issue of ELECTRICAL WEST, p. 150.

Special Construction Increases Truck Pay-Load

SPACE available for materials and equipment and carrying capacity for maximum pay-load are important factors in any service truck. F. S. Beach, assistant engineer, Northwestern Electric Company, Portland, by means of an all-steel design, has added 50 per cent to the effective bin space, 625 lb. to the pay-load capacity, and effected an appreciable saving in actual body cost of a two-ton truck in that company's use. The truck is designed to serve a four-man crew, comprised of a driver, a foreman, a lineman, and a "grunt." This crew puts in heavy services, sets meters, mounts a few transformers, and erects some cross-arms. Thus, the carrying space for men, materials, and equipment is of particular importance.

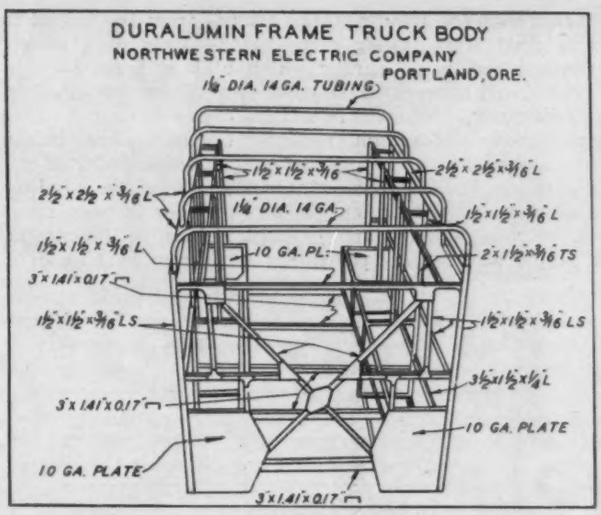
The design of this truck is simple. All fabrication was done in an ordinary sheet metal shop using No. 12, 14, and 16 sheet steel. The angles and channels comprising the body frame were formed of No. 12 sheet. The frame cross-members upon which the floor is built were electrically welded at the end to keep out dirt and moisture and flared both ways at the floor line to provide a double bolting flange on which the floor could be solidly mounted. The only wood in the entire body is the floor, a small shelf for incidentals, and two board seats added by the crew.

Top bows were made of hollow tubing with welded stirrups which fit into supports attached to the vertical

This all-steel frame body increased the pay load capacity of the truck by 625 lb.

frame members. A single mounting bolt expedites the removal of the bows when the top is not desired. The top itself buttons at the forward end of the body and laps over the rear end with a draw string and trap with which it may quickly be drawn into place and tightened.

Greatly increased bin space was provided by the steel siding without enlarging the truck body and without encroaching on the floor space inside. With this steel construction, bins 16 in. deep were obtained against the usual 10½ in. depth available with the ordinary wooden body. These bins were not sub-divided when the truck was built, the sub-division being left to the line foreman to suit his needs.



Construction details of the duralumin body shows simplicity, yet sturdiness, of fabrication

Outside width of the truck body is 6 ft. 4 in. Material hooks hang along the upper inside frame member and may be removed at will.

Excepting a small panel at the forward end which is provided to permit the easy removal of the power winch, the steel side panel is one solid sheet. A removable niggerhead for the winch is carried on the running board in a special rack.

Electric welding was used throughout the body construction to the complete elimination of bolts and screws, except for the few where wood parts are encountered. Ordinary window sash locks were used for the doors on the bins.

Another saving in body weight was effected by using duralumin construction on one- and one-half-ton trucks. At no additional cost above standard body construction, 620 lb. was added to the pay-load capacity with the lighter body. The only complaint is that the body is so light that, when not loaded, the truck does not ride easily.

The gain in pay-load means saving a ton-mile for every three miles which the truck is operated. This was done at a body construction cost of $1.002 per lb. completely fabricated, assembled, and ready for service on the chassis. The cost of the duralumin materials and fabrication, minus wood panels, etc., amounted to $1.97 per lb. Considering the gross weight of the truck ready for service with the body complete, the cost amounts to 41.2 cents per lb., about the same as the average cost of an ordinary 1,500-lb. body.

Past records and operating experience of the company show these bodies to be a tremendous improvement over the steel reinforced wooden bodies used before.

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Merced Falls Outdoor Hydro Plant First in California

AT MERCED FALLS, Calif., the San Joaquin Light & Power Corporation has erected the first outdoor hydro generating unit to be installed in California. Replacing an obsolete plant at a site where the available head is only 27 ft., the new installation makes available 700 per cent more power from the stream flow and, by eliminating the building, has saved approximately $12,000 in first cost. A 4,000-kva., 128.6-r.p.m., 12,500-volt generator, enclosed in a sheet-steel, weather-proof housing, is driven by a propeller-type Smith-Kaplan turbine adapted to low head developments. The conventional governor is not used, but instead a sensitive float control is substituted which automatically and simultaneously adjusts the turbine wicket gates and the angle of the turbine blades to compensate for changes in stream flow. Complete protective and control equipment, housed in the building to the right of the crane, makes this unit practically self-operating.

The outdoor unit may be seen through the crane with the control house at the right

Install Non-Resonating Transformers on Coast

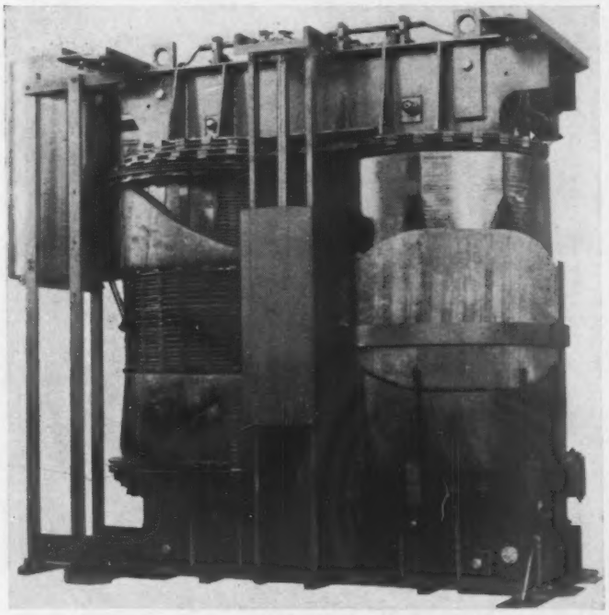
By WALTER C. SMITH
Sales Engineer, General Electric Company, San Francisco

TEN non-resonating transformers, permitting higher safety factors and reduced electrical stresses throughout the windings, even in severe lightning conditions, have been built by the General Electric Company for recent West Coast use. Of these, seven 20,000-kva., 215,000-volt units are in the Tiger Creek station of the Pacific Gas and Electric Company and the remaining three, 40,000-kva., 220,000-volt units, have been placed in Long Beach No. 3 station of the Southern California Edison Company, Ltd.

Insulation is co-ordinated with the rest of the transmission system, the units being electrically stronger than the insulators which carry the 220,000-volt transmission lines. Thus, if lightning should strike the line or high-voltage surges be induced by a nearby stroke, the line insulators will be the first to flash over and relieve the abnormal voltage stress. Bushings are also co-ordinated.

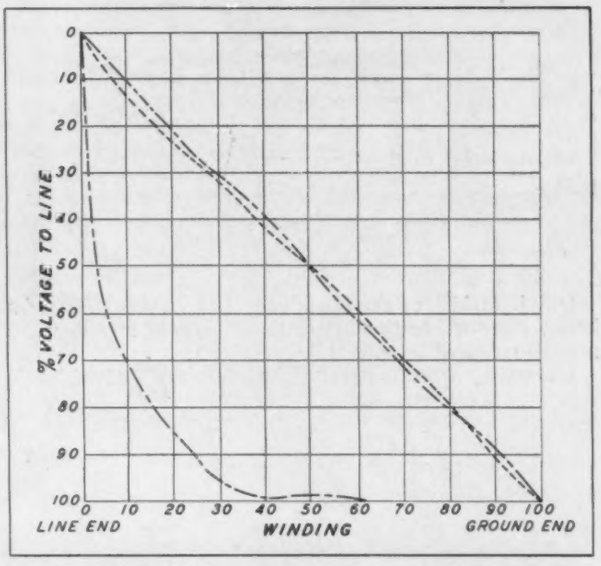
Until recently it was necessary to insulate between turns and coils far in excess of the A.I.E.E. standards because of these abnormally high voltages in the windings, both between turns and coils and to ground. Safety factors 10 to 400 times those called for in the standards were often provided.

In the conventional transformer, because the windings act as condensers rather than inductances when a high voltage is applied *suddenly* to the line turn, the charging currents are obliged to flow through the windings. This is similar to the action on a string of suspension insulators, where the shunt capacity currents to ground make the currents and voltage drops in the line end greater than near the grounded end. After the first few microseconds the voltage distribution becomes uniform throughout the windings, the change from the initial to this final state taking place in the form of a slowly damped oscillation during which high voltages both to ground and between coils appear throughout the winding.



Each transformer, with 14,000 gal. of oil, weighs about 136 tons; without oil, 84 tons. During shipment the tanks were filled with nitrogen to exclude air and moisture

Obviously, conditions in a transformer during the first quarter-cycle of a high frequency oscillation are similar to those mentioned before. During the remainder of the oscillation, however, many internal points of the winding may be stressed to potentials much higher in proportion to the voltage of the applied impulse than in the case of a single wave. This possibility is present because of a series resonance between portions of the windings at certain critical frequencies where one part may act as capacitance and another portion as inductance.



Characteristics of non-resonating transformers. The two upper lines are the theoretical and actual tests; lower curve is that of standard unit

Through research work by General Electric engineers, a patented scheme of shielding the windings of high-voltage transformers has been worked out to prevent completely internal oscillations. Metallic shields, connected to the line lead, are located adjacent to the windings, to supply the correct electrostatic charging currents to each turn and coil. Each turn is thereby so located in the dielectric field that its potential under any transient conditions will be that which it would assume under normal frequency excitation.

The distribution of the potential throughout the windings of a shielded or non-resonating transformer is therefore uniform under all conditions. It is interesting also to realize that the usual induced voltage test as specified by the A.I.E.E. is, on non-resonating transformers, a real measure of the ability of the design to withstand lightning, whereas on a conventional type the test is worthless for that purpose.

Because the units at Long Beach are near the ocean and subject to the salt fog which leaves conductive deposits on the high-voltage bushings, these latter were specially designed to give an extra long creepage distance between live parts and the tank so that they may be washed periodically with a spray of water without removing the transformers from service. The bushing is supplied with an arcing horn to form a gap by which the normal dry flashover value of the bushing is maintained.

Beetles Damage Lead-Covered Cables

CASES of damage to aerial lead-covered cables by lead-boring insects have been reported from California, China, and Australia. The most recent infestation has been found in Brazil, and extensive investigations have been made, chiefly by the U. S. Department of Agriculture. E J. P. Rendell, of the *Emprezas Electricas Brasileiras*, Rio de Janeiro, reported that in February, 1928, one month after a line had been tested and placed in service, reports of low insulation were received. Investigation disclosed small holes penetrating the upper half of the lead sheath. The trouble recurred continuously until June, when reports ceased for the year. At approximately the same period in 1929 and 1930 further instances of insect boring were found.

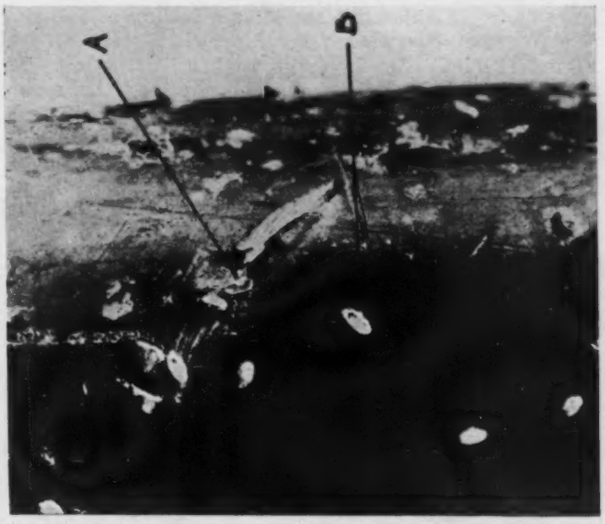
Sometimes the cable breakdown would be caused by one hole only, but as many as 80 holes have been discovered in one 40-meter span. Experiment proved that the insulation of the cable is not damaged by the insect but by the moisture which passes through the hole. A desiccating pump proved invaluable in speedily locating the presence and position of the holes. Close examination revealed the presence of eggs of "Magaderus stigma," a wood-boring beetle. The larvae from these eggs, and not the adult beetle, did the boring.

To combat the insect, the plain lead sheath was wrapped in white cotton tape, the tape afterwards being painted with a red oxide paint. Tarred jute has also been suggested as a cure, giving protection from the larvae and making the cable distasteful to the adult beetle.

Commenting on the Brazilian findings, T. E. Snyder, senior entomologist of the U. S. Department of Agriculture, Washington, D. C., says:

"This represents a unique case of insect damage to metal. The species studied in this country, a Bostrichid, in the adult stage, attacks lead sheathed aerial cables, apparently stimulated in its attack by the contact stimulus, since most of the attack is at the point of contact of the cable and the ring which supports it. Injury has been prevented by changing the character of the cable ring and thus preventing the insect from propping itself in order to facilitate boring. Soft beef tallow placed on the cable will also prevent attack.

"Apparently all damage to cable by insects is accidental. The insects either emerge from wood and continue to bore through metal which is in contact with the wood or haphazardly attack metal, being stimulated by some tropism."



Enlarged section of cable showing (A and B) eggs of insects and mutilation of lead sheathing

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New Books

MACRAE'S BLUE BOOK, with which is consolidated Hendrick's Commercial Register. W. J. McCamman, 1202 Hearst Building, San Francisco, and T. H. Foley, 1625 Glendale Blvd., Los Angeles, Western distributors; 3,500 pages; price $10.—Four new sections have been added this year to increase the usefulness of this purchasing guide and directory; one of these is the index to classifications in which industrial products of all kinds are listed alphabetically. The trade facilities section, another new feature, lists by states, all municipalities of more than 1,000 population. Given are the leading bank, its cashier, the leading commercial body, its secretary, and the names of all railroads, airports, and warehouses of each town. Canadian manufacturers are represented for the first time with two classifications, Canadian address section and Canadian classified section. Other features are the same, but revised to date. Some 5,000 Pacific Coast manufacturers are listed.

PLANT LOCATION, by W. Gerald Holmes, industrial engineer, Cloth bound; 6 x 9 in.; 275 pages; 30 illustrations. First edition. Published 1930 by McGraw-Hill Book Company, Inc., New York. Price $3. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—This book is one of the units of the McGraw-Hill Industrial Management Series, prepared under the direction of Dexter S. Kimball, consulting editor. The author is an accepted authority in his field and he bases his text upon the economic changes that have occurred during recent years which have made plant location one of the most important problems of industrial management. The actual subject matter is the outgrowth of the author's experience in plant location in the interests of both the manufacturer and the community. It reflects experiences in the attempt to apply principles of scientific management to the solution of the important problem of plant location. The whole treatment is based upon unit cost procedure in accordance with modern methods of cost finding. The book itself is divided into three general parts: Choosing the General Territory, Choosing the Particular Community, and Choosing the Site. It is logically subdivided further into sixteen chapters and supplemented by an appendix.

ALTERNATING CURRENTS for Technical Students, by Calvin C. Bishop, head of the Department of Drafting and Design, Technical High School, Buffalo, N. Y. Cloth-bound; 5 x 8 in.; 317 pages; 330 illustrations. First edition. Published 1930 by D. Van Nostrand Company, New York. Price $2.—In this book the author presents the fundamental principles of a.c. theory, circuits and apparatus, and explains them through the liberal use of illustrations and with simple mathematics. The book obviously is intended for technical or vocational students, and could be used to advantage by those familiar with direct-current theory, but who find themselves called upon to become familiar with alternating-current theory and apparatus. Its thirteen chapters include alternating currents, inductance, capacity, series circuits, parallel circuits, vectors, transformers, asynchronous and synchronous motors, rotary converters and other apparatus, tests and measurements, and trigonometry useful in solving vector problems.

ARITHMETIC OF ELECTRICITY, by T. O'Conor Sloane. Cloth-bound; 5 x 7 in.; 230 pages; illustrated. Twenty-third edition, revised and enlarged. Published 1930 by the Norman W. Henley Publishing Company, New York, N. Y. Price $1.50.—This is a practical treatise on electrical calculations of various kinds reduced to a series of rules of simple form and involving only ordinary arithmetic. Each of the rules given is illustrated by one or more practical problems together with detailed solutions of each. The subjects treated include Ohm's law, a.c. and d.c. circuits, and network circuits. In general, fundamental problems are dealt with in a simple fashion designed to serve the practical electrician.

ELECTRICAL DISTRIBUTION ENGINEERING, by Howard P. Seelye, engineering division, The Detroit Edison Company. Cloth-bound; 6 x 9 in.; 710 pages; 394 illustrations. First edition. Published 1930 by McGraw-Hill Book Company, Inc., New York, N. Y. For Sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco, Calif. Price $6.—Prompted by the belief that distribution engineering requires a knowledge of the fundamentals not only of electrical engineering, but also to some extent of civil engineering and of engineering economics, the author has brought together in this book many of the essentials of the three branches of engineering that enter into the economic design and construction of electric distribution systems. The author emphasizes methods of application and the fundamental reasons why things are done with the belief that while the science of electric distribution is developing rapidly as to practice, the basic fundamentals already are well established. The book is organized into 37 chapters under three divisions—electrical design, mechanical design, and economical design. Material is based directly upon practical experience.

Construction

Simplified Job Control Record

Contractor and Workmen Benefit When Work Is Well Organized and Both Can See What They are Accomplishing

By CLAIR C. KILLEN
Los Angeles

The author of this valuable method of keeping a running record of electrical construction work is a supervising electrician whose hobby has been the study of industrial engineering methods and philosophies. In the method outlined here he has adapted and applied some of the best industrial plant job control methods, simplified and easy to maintain, to electrical construction work. The proof of the pudding is that he has employed this method on behalf of his employers successfully for five years, taught many foremen, estimators, and even contractors the profitable use of the method and, though having copyrighted its forms, now offers it to the electrical construction industry in the interests of better management. Mr. Killen served his apprenticeship as a wireman in Detroit, Mich., worked some years as journeyman, and for the past fifteen years has been supervising, estimating, and engineering electrical construction. He is a member of the Society of Industrial Engineers

MEN who started to work as apprentice wiremen, say twenty years ago, have seen many changes take place in the electrical industry in that period of time.

Labor productivity has increased to a marked degree. This is true because of better factory-made equipment and materials as well as the use of power-driven tools and labor-saving methods. The individual electrical worker is keeping up with technical development in the wider uses of electricity and in the better methods of wiring installation. Free trade schools are encouraged and supported by all the groups in the industry from the public utility corporations to the trade unions. Contractors' trade associations are doing research and other association work to raise their business above the sweatshop level. Trade unions are beginning to take on responsibility in their function, which is more effectively to market their supply of labor. The engineer, estimator, superintendent, and job foreman are becoming production executives as well as pure technicians.

Economics of the actual job, however, have been little controlled. Many contractors still think that a perspiring and panting gang on a job means that the job efficiency is high, that pressure applied from the top makes for results. They do not realize that less of their effort is needed to lead than is needed to push, to get the given amount of work done.

Use of the slide-rule, rotometer, quantity take-off sheets, and other helps has long been recognized as good practice in the contractor's office. For the making of layouts and for estimating, obviously they are necessary. The use of labor-saving tools on the job has long been accepted as good construction practice. Knowledge of the economics of the job is as important in the operation of a construction business as the table of conduit and wire sizes is to the same business. In the use of the accompanying chart, a proved tool or gage is submitted. It is designed to be used on the job by the foreman or wireman in charge to measure individual or group accomplishment.

Among pioneers in the science of management in America, outstanding are the names of H. L. Ganntt, Harrington Emerson, Walter N. Polakov, and Wallace Clark. A study of their work and industrial philosophies led to an effort to adapt some of their fundamental principles of management to the problems of production arising in our every-day electrical construction conditions. The two accompanying chart forms are the tools used in measuring accomplishment on the job. This method has been developed over a period of years spent in a supervisory capacity while working with the tools, and used continually with beneficial results to the contractor, estimator, and men. Chosen to illustrate the use of this record form is a particular job which portrays an efficiency variation ranging from 44 to 135 per cent on one job over a period of four weeks.

The objects of timekeeping in its broad sense are:

1. To know who worked and when.
2. To know what each man did and what he was paid for doing it.

It is also very interesting to know what is being done and how it is being done, as well as how much it is costing to do it.

For the purpose of explaining the printed forms, the large figure (1) identifies the column listings of the payroll for the day which, in this case, totals $75.80. Figure (2) indicates the space used to list the material actually installed. The amount opposite the listed material is the figure used by the estimator in figuring his estimated labor cost of the job. According to his estimates it should have cost $39.20 to do the work done that day. But it cost $75.80. Thus the percentage of efficiency of this gang, if the estimator was right, was the relation of $39.20 to $75.80 which is graphed in the space below (3) as 52 per cent. The space below that is a daily log of progress, troubles and delays. The information listed in the space marked (4) consists of reasons, not excuses, why more work was not done. The reasons are many but the contractor is only interested in them in determining how much they cost him so that thereby he may eliminate them.

In the space marked (1), if it were desirable or practical, the individual man's or team's accomplishment could be written in. However, in this case it was not done, and care should be taken to use this sheet in a manner so that it will not in any way cause workmen to be afraid of it. Their co-operation in keeping up the chart is desirable. For the next day, running down through pay-

roll, work done, per cent of performance and reasons why, a similar condition will be noted.

The third day there was a jump to 91 per cent and the log tells why.

The fourth and fifth days were hectic recurrences of Thursday and Friday.

The last day of this work week ending Jan. 9 was encouraging. "Had we been able to borrow other contractors' tools and equipment every day, as we did this day, we would have been able to maintain a fair average."

The total payroll for the week, marked (1A), is seen to be $394.40. The total work done this week, marked (2A), is seen to be $247. The relation of one to the other makes for a weekly average of 63 per cent. This is shown as (3A). The space marked (4A) is an analysis for the week and the proper pro-rating of the losses.

From this it will be seen that:

1. *Absent men* cause a little expense inasmuch as the foreman has to rearrange the gang and place men on the work the absentee was doing.

2. *Lack of lay-out* from the office causes work to be installed in the wrong place. Architects are famous for "passing the buck" on this.

Job Name—*Sash Control—Cement Plant—*
Job Number—*D-4065*

Weekly Job Record Chart.

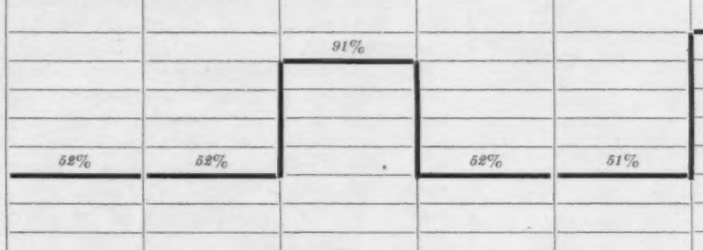
Week Ending *Jan. 9th.*

Name	Rate	Thurs. Work	Thurs. Wages	Fri. Work	Fri. Wages	Sat. Work	Sat. Wages	Mon. Work	Mon. Wages	Tues. Work	Tues. Wages	Wed. Work	Wed. Wages	Pay-roll Hrs.	Pay-roll $	Work Done This Week
H. Riggs	*1.12½*		*9.00*		*9.00*		*4.50*		*9.00*		*9.00*		*9.00*	*44*	*49.50*	
H. Fitz	"		*9.00*		*9.00*		*4.50*		*9.00*		*Absent*		*9.00*	*36*	*40.50*	*90' 1¼" Cond. 18c per ft. 16.20*
F. Corsenus	"		*9.00*		*9.00*		*Absent*		*9.00*		*9.00*		*Absent A.M. 4.50*	*36*	*40.50*	*390'-1" Cond. 12c per ft. 46.80*
A. Peters	"		*9.00*		*9.00*		*4.50*		*9.00*		*9.00*		*9.00*	*44*	*49.50*	*550'-¾" Cond. 10c per ft. 55.00*
G. Lowery	"	(1)	*9.00*		*9.00*		*4.50*		*9.00*		*9.00*		*9.00*	*44*	*49.50*	*14 Push Buttons 1.50 each 21.00*
D. Adler	"		*9.00*		*9.00*		*Absent*		*9.00*		*9.00*		*9.00*	*40*	*45.00*	*10-60A.(D) 3 Pole SW 2.00 20.00*
A. Widener	*.67½*		*5.40*		*5.40*		*2.70*		*5.40*		*5.40*		*5.40*	*44*	*29.70*	*10 Control Cab. 3.00 each 30.00*
T.R.Murphy	"		*5.40*		*5.40*		*2.70*		*5.40*		*5.40*		*5.40*	*44*	*29.70*	*5800'-No. 12 R.C. Wire 1c per ft. 58.00*
															(1A)	(2A)
C. C. Killen	*1.37½*		*11.00*		*11.00*		*5.50*		*11.00*		*11.00*		*11.00*	*44*	*60.50*	
Daily Total			*75.80*		*75.80*		*28.90*		*75.80*		*66.80*		*71.30*	..	*394.40*	Total *247.00*

Material Installed Daily (2)	Thurs.	Fri.	Sat.	Mon.	Tues.	Wed.
	50'-1¼ C. 9.00 *10'-1" C.. 1.20* *1500'-#12 R. C....15.00* *4-60A (D) S. W... 8.00* *2 Control Cab.... 6.00* *(E)*	*40'-1 C. 7.20* *60'-1" C.. 7.20* *100'-¾"C.10.00* *10 Push Butt Stations 15.00*	*1800'-#12 R. C....18.00* *4 Push Butt... 6.00* *20'-1" Cond... 2.40*	*6-60A (D) S. W...12.00* *8 Control Cab....24.00* *30'-1" Cond... 3.60*	*120'-1" Cond...14.40* *200'-¾" Cond...20.00*	*2500'-#12 R. C....25.00* *250'-¾" Cond...25.00* *150'-1" Cond...18.00*
Total	*39.20*	*39.40*	*26.40*	*39.60*	*34.40*	*68.00*

63% for Week

Daily % Reached (3)



Daily Log of Progress Troubles Delays (4)	Thurs.	Fri.	Sat.	Mon.	Tues.	Wed.
	Power off at 4 p.m. No fish tapes. Defective dies, Electric Drills. 5" Sq. Boxes all sent with ½" K.O. for 1" Cond.	*Not enough ladders. No location for Cabinets, tore down and reset 2. No Box or Shanty on job. No Whitney Punch.*	*Borrowed fish steel from Ford. Used Iron Wks. Scaffolds and Painters ladders.*	*Same as Thurs. and Friday. Need ½ hand lines, ladders, Punch, Electric Drills, etc.*	*Same as Thursday, Friday, and Monday.*	*Borrowed fish steel from Ford. Ladders from Painters, and #20 Whitney Punch from Sash-men.*

Reasons For Falling Behind — Amount

A.	Absent	3.00
C.	Changes	.....
D.	Delays	.....
H.	Lack of Help	.....
L.	Lack of Lay-out	10.00
M.	Material	5.00
P.	Power	10.00
T.	Tools	114.90
W.	Weather	.....
X.	Doubtful	4.50
...	No Estimate	.....

(4A)

Total 147.00

Pay-Roll 394.40
Work-Done 247.00
Behind Estimate . 147.40

Summary of Week's Activity

10 Motors finished and running. Get Fish-Steels, Ladders, 200'-⅛" Hand-Line, New Dies, Cutting Oil, Piano-Box with hasp, hinges and padlock. (9 men spend ¼ hr. daily finding place to hide wire and tools overnight.) All Pull Boxes should have 1" K.O., costs 50 cts. each to ream by hand from ½" to 1". Get #20 Whitney Punch with 5 extra plungers, 2-100' extensions for Electric Drills. Power goes off daily at 4 P.M. 3 Electric Drills on job are defective and grounded. Men working on 60' ceiling. Amount lost this week would pay for needed tools and equipment. If they are procured we can make up for losses. If not we will go behind again next week.

Next Week's Schedule.

Will finish 6 remaining Sash Motors and start running feeds to cabinets.

JOB NO. D-4065 — JOB RECORD SUMMARY CHART. — JOB NAME. SASH CONTROL-CEMENT PLANT

WK. ENDING	PERCENT WORK DONE COMPARED WITH ESTIMATE. (20 40 60 80)	LOST	SAVED	LOSSES & SAVINGS DUE TO: DELAYS	LAY-OUT	MATERIAL	POWER	TOOLS EQUIP.	ABSENT MEN	DOUBTFUL		SAVING	REMARKS
JAN 2	44	86.00		10.00	45.00	31.00							MEN ON JOB BEFORE MATERIAL
" 9	63	147.40			10.00	5.00	10.00	114.90	3.00	4.50			MORE MEN BUT NO MORE TOOLS & EQUIP.
" 16	92	45.60						45.60					STILL NOT ENOUGH TOOLS.
" 23	135		140.00									140.00	TOOLS CAME LAST WEEK. THIS COULD HAVE BEEN NORMAL.
TOTAL LOST LABOR		279.00		10.00	55.00	36.00	10.00	160.50	3.00	4.50		140.00	
TOTAL GAINED LABOR		140.00											
NET LOSS ON ESTIMATED COST		139.00											

3. *Material*—This has to do with the purchasing man in the office not specifying that all 4¹¹⁄₁₆-in. boxes should have had 1-in. knockouts. To ream from ½ to 1 in. by hand costs 50 cents per hole.

4. *Power*—In this plant the power went off at 4 p.m. The contractor's men worked until 4:30 and could use electrically driven tools only until 4 o'clock.

5. *Tools and equipment*, or the lack of them, is the big item. Such things as fish steels, cutting oil for dies, ladders, punches, hand lines, a big tool box for storing tools and wire overnight, good electric drills, sharp dies, etc., were needed.

6. *Doubtful*—Under this head goes anything that cannot be honestly charged to any of the above.

The space along the bottom of the sheet headed "Summary of the Week's Activity" is self-explanatory, as is the space headed "Next Week's Schedule."

The apparent poor showing of this particular week, though seeming to be very serious, is not uncommon. The conditions illustrated stand out because they are recorded and seem so obviously unnecessary. The fact that such conditions exist often and that the contractor or his manager does not know where the losses occur causes him to charge the high cost to a poor gang, a worse foreman or "just a tough break." The possibility of poor management above the foreman is very seldom considered.

Passing from this weekly job record chart to the job record summary, the latter will be seen to be a sheet designed to record the summarized economics of the job at the end of each work-week.

This particular job started off with a first week's production of 44 per cent. The fact that only $86 was lost the first week is accountable to the fact that the payroll was smaller and a holiday occurred that week.

The next week, starting Jan. 9, which is reproduced in detail in the other chart, shows a percentage of 63.

The third week, Jan. 16, shows an accomplishment of 92 per cent. If the job lasts long enough the production may get up to par.

The fourth and last week's production was 135 per cent. The nature of the work this last week was the same as during the previous weeks. This proves that the estimator's units were not too low, but really very liberal. It was not a case of going behind on conduit installation and making up the losses on wire-pulling and other finishing operations. The last week's production was easily accomplished and less individual energy was used up in the last week than in any of the other weeks.

With proper planning and management this job could have been done in three weeks' elapsed time instead of four weeks. Management, not men, was responsible for the comparatively high cost on the job. A very serious effect on the morale of the workmen is always evident when work is poorly planned, under-equipped, badly engineered, and half-managed.

For a cost record this method shows immediately, clearly, correctly, completely and continually:

1. Whether a loss occurs;
2. Where a loss occurs;
3. How a loss occurs;
4. How big it is;
5. How it is to be prevented;
6. Who is to prevent it, and then,
7. Has a repetition of it been prevented?

In case of work being done on either a percentage or time-and-material basis this method can easily be used in functioning as a cost finder as well as a cost record.

Responsibility is placed squarely where it belongs, viz., where the authority for action lies. Use of this chart makes it necessary to have a plan. It compares work done with work planned, showing reasons why men or management fall short of plan or go beyond it. It is remarkably compact and is easy to keep. The keeping of a nine-man job record such as is reproduced here takes 15 minutes per day of the foreman's time. It visualizes the passing of time and helps reduce its waste. In other words, it measures momentum, rate of flow, resistance, and pressure. Therefore, this method is a gage, a tool that measures the service rendered by the (1) workers, (2) foreman, and (3) management.

If failure is due to absence, slowness, avoidable mistakes, it is the fault of the worker. If failure is due to the improper use of men on the work they are best fitted for, the poor interpretation of lay-out or specifications, or, in general, bad management and inability to lead and command respect from the gang, it is the fault of the foreman. If failure is due to lack of lay-out, poor tools or lack of equipment the fault is with the management.

It shows how well the management is organized to get things done. It is a simple and effective way of presenting facts so that they can be easily understood. It is the only scientific way of arriving at new standards when new standards should be set. For example, a contractor must know actual segregated costs before he can start lowering or raising his estimated unit costs.

After such tools of measurement have been in effect for some time it will be found that:

1. Tools and equipment will be in better shape.
2. There will be enough of them provided.
3. Gangs and men will be moving more rapidly and with less confusion from one operation to another.
4. Increased production will result, not by speeding up men, but by removing obstacles that prevent men from doing their best.
5. Costs will be reduced because of elimination of idleness and waste as well as improvement in method.
6. Men in subordinate positions will be willing to shoulder responsibility instead of "passing the buck," because of more clear-cut duties.
7. Courage and initiative will be stimulated in the men because they know they will get fair play.
8. Favoritism or special privilege will be less because the gang record can be seen by all if necessary.
9. Better satisfied workers will result because delays over which they have no control are eliminated and they are left to do a full day's work and get more wages out of the industry.
10. Promotions will go to the men who know the economics of their jobs as well as the technique. Organizations will be built up of men who know what to do, when to do it, and how to do it.

11. Men will be more interested in their work, not only for the wage incentive, but the interest the graphic method of presenting facts arouses, as a score-board does at the ball game.
12. Men will be better able to see the problems of management and by such experience realize that the authority to issue an order involves the responsibility to see that it is executed.
13. Such changes in operation and mental attitude will make for a greater measure of effective democratic management in the industry.

The flexibility of this method of measuring the efficiency of men and management makes it an easy matter to use on any operation where the work is planned, estimated, or done on a unit-cost basis. If, due to any unusual condition, it seems impractical to keep every day's production separately it can easily be kept grouped for two or more days at a time.

The foreman on the job will be taught to become a better foreman and an estimator. The wireman on the job will be taught to become a better wireman and a foreman. With great changes in our industrial America taking place it is very short-sighted and costly on the part of management in the electrical construction field to withhold the knowledge of the economics of the job from the man on the job.

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Floodlighting a Portland Service Station

THE effect of floodlighting a service station is seen from this night view of a Texaco station at Nineteenth and Lovejoy Sts., Portland. Three Benjamin duo-service floodlights carrying 1,000-watt clear lamps are mounted 24 ft. above the ground and 40 ft. from the

station. The other station lighting was turned off while the photo was taken. M. S. Glenn, illuminating engineer, Northwestern Electric Company, Portland, designed the installation, which was made by E. L. Knight Electric Company.

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Why 110 Volts Is Often Fatal

EXPLAINING the necessity for caution in handling 110-volt alternating current and ascribing to it the numerous deaths which occur from persons becoming grounded between 110-volt circuits and water piping, Frank Short, engineer for the Industrial Accident Commission, points out that 110-volt alternating current is in reality equivalent to 310 volts direct current in effectiveness.

"No one so far has contradicted me successfully on this matter," says Mr. Short, "and I believe the theory is correct." He goes on to explain that 110 volts is the effective or mean voltage on a circuit rated at that capacity but that calculations from an a.c. generator formula show the voltage to be $1.41 \times 110 =$ 155 maximum voltage. A 155-maximum voltage circuit passing through an instrument registers upon it the effective voltage of 110 volts. The character of alternating current, however, makes the electrical wave pass from zero through 110 to 155 volts on the positive side, then back down through zero and to 155 volts negative and back again 120 times a second for 60-cycle current. In this way the wave passes from 155 positive to 155 negative, a total of 310 volts. At this frequency it can be understood that a body receiving a shock of 110-volt alternating current undergoes considerable stress. With 110-volt direct current, this effect is not menacing.

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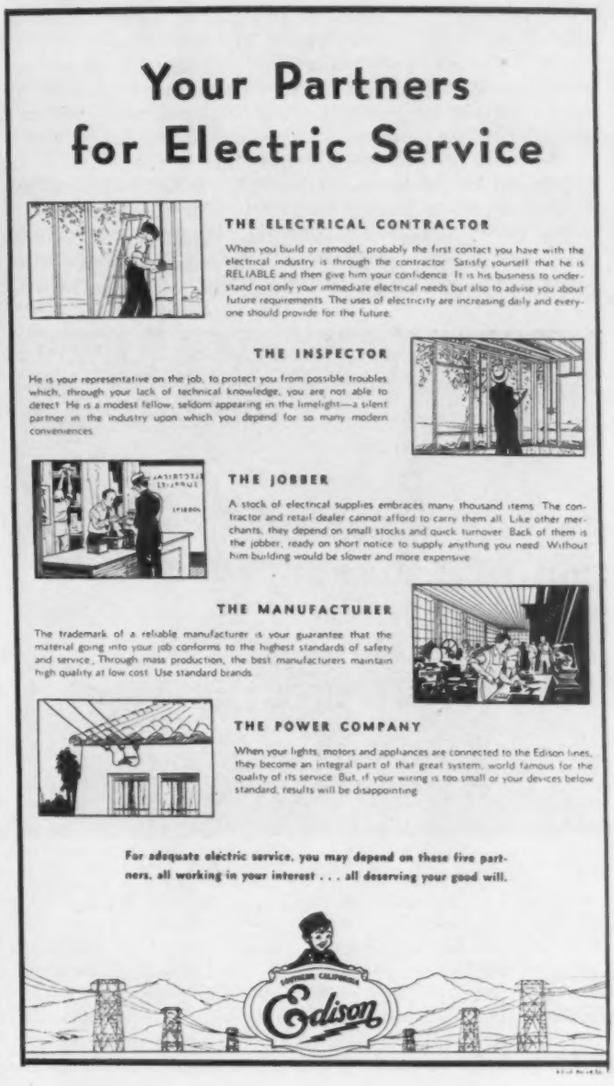
For One— For All

PLAYING up not one but all of the branches of the electrical industry which enter into the wiring of a building, this advertisement of the Southern California Edison Company, Ltd., aims to build "industry consciousness" in the public. It is a step toward bringing closer together the five partners in electrical service, in keeping with the general policy of utility companies as expressed in recent conventions. For the first time the electrical inspector's value to the public is being stressed in an advertisement.


Your Partners for Electric Service
THE ELECTRICAL CONTRACTOR
When you build or remodel, probably the first contact you have with the electrical industry is through the contractor. Satisfy yourself that he is RELIABLE and then give him your confidence. It is his business to understand not only your immediate electrical needs but also to advise you about future requirements. The uses of electricity are increasing daily and everyone should provide for the future.
THE INSPECTOR
He is your representative on the job, to protect you from possible troubles which, through your lack of technical knowledge, you are not able to detect. He is a modest fellow, seldom appearing in the limelight—a silent partner in the industry upon which you depend for so many modern conveniences.
THE JOBBER
A stock of electrical supplies embraces many thousand items. The contractor and retail dealer cannot afford to carry them all. Like other merchants, they depend on small stocks and quick turnover. Back of them is the jobber, ready on short notice to supply anything you need. Without him building would be slower and more expensive.
THE MANUFACTURER
The trademark of a reliable manufacturer is your guarantee that the material going into your job conforms to the highest standards of safety and service. Through mass production, the best manufacturers maintain high quality at low cost. Use standard brands.
THE POWER COMPANY
When your lights, motors and appliances are connected to the Edison lines, they become an integral part of that great system, world famous for the quality of its service. But, if your wiring is too small or your devices below standard, results will be disappointing.
For adequate electric service, you may depend on these five partners, all working in your interest . . . all deserving your good will.
Edison

"Back Drop" Lighting To Sell Refrigerators

TO SELL results and not lighting equipment should be the lighting salesman's aim, because results pay dividends while lighting equipment costs money. Business men are not interested half as much in wattage or lighting as they are in results. For this reason many a good lighting job has been lost or cut down by confusing a customer's mind with technical terms and wattage consumption data.

By keeping this in mind and working for a goal of excellent lighting, a total wattage of 11,300 was installed in one of the stores of the George Belsey Company, distributors of General Electric refrigerators, in place of the original equipment of 750 watts.

This store, at the corner of Wilshire and Western Aves., a most prominent location in Los Angeles, was 26 x 80 ft. long with an 18-ft. ceiling. All of one side and one end was of plate glass, giving plenty of reflection by day and a poor visibility at night because of the high intensity of the street lights outside.

The store layout was simple and effective, a platform 30 in. wide by 6 in. high extending 40 ft. down the blank side of the store for a display of each type of refrigerator. The corner window had been beveled off so that a refrigerator displayed at this point could be seen by the two-street intersection. All windows were without backs, allowing shoppers to see through the entire width of the store to the 40-ft. display along the blank wall. The center of the store was occupied with chairs, tables, writing desks, and other necessities for customers.

The first problem was the corner window. By using the powerful beam of four large reflectors with 500-watt lamps and controlling this light with spill rings to prevent glare about the store, the desired result of making the show window free from external reflections was effected. The end window was treated with a duplicate of this equipment. Because no display was to be placed in the windows on the long side of the store, four smaller reflectors with 200-watt lamps to provide a dash of color if needed were used.

Front view of the new Belsey store. The four reflectors may be seen above the corner window and the row of smaller units behind molding may be seen on the left

The five ceiling outlets originally containing 150-watt lamps with inclosing globes were changed to five semi-indirect units of 500-watt capacity. This gave ample light in the store itself, but to display the refrigerators effectively on the 40-ft. platform a stage effect had to be designed.

A Stage Effect

A 40-in. molding similar to one used as a border about the room was installed the length of the room, 3 ft. from the wall and directly over the display platform. This offered concealment for 40 small reflectors with 100-watt lamps on 12-in. centers and projected a curtain of light down upon the full length of the display.

Rear view of the store with "back drop" lights illuminating the row of refrigerators. Forty small units were used in this row, each mounted on a 12-in. center

Now customers sit down and relax in easy chairs and view the display of brilliantly illuminated refrigerators under this bank of overhead lights. From outside the highly lighted "back drop" is seen even through the street light reflections on the plate glass windows.

As an indication that actual results were sold, already one of the many out-of-town distributors who have seen this store has asked for a duplicate installation.

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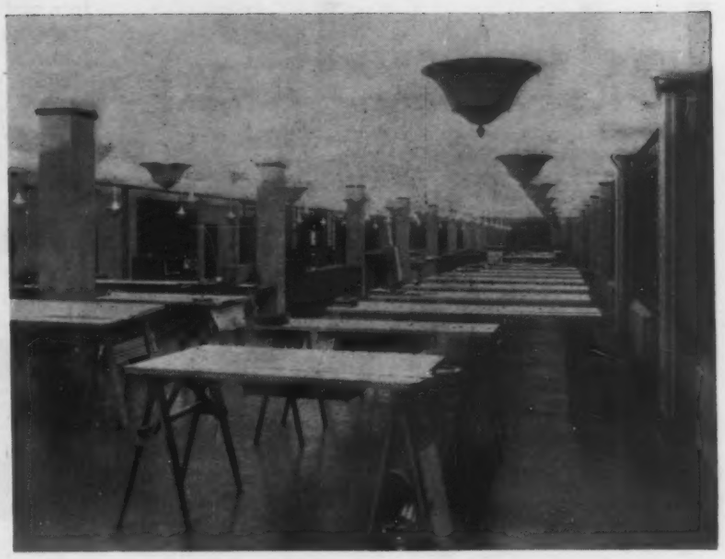
Estimators Name Some Contracting Wastes

Some contracting wastes which must be considered by the electrical estimator have been set down by the Los Angeles Estimators' Section, Association of Electragists International. A few of these are:

1. Loss of time by men around the shop, because whoever is in charge has not put them to work.
2. Loss of time going from one job to shop and then to another job.
3. Not enough supplies or right supplies delivered to a job.
4. Material improperly laid out on the job.
5. Inadequate and indefinite plans.
6. Material arriving late because of delays by manufacturer or by contractor.
7. Foremen unfitted for their jobs, resulting in poor job direction.
8. Mishandling of wire which shows up after job is installed and then has to be replaced.
9. Loss of time because of accidents.
10. Lack of proper tools.
11. Work installed in such a way that inspector will not pass it, which necessitates work being done over.
12. Too many men on the job.
13. Slow progress and piecemeal work by the general contractor.
14. Incompetent mechanics.
15. Lack of incentive.

Airplane Drafting By Indirect Lighting

Seattle's Boeing Airplane Factory Mixes Artificial Light and Sun Light, Placing Working Tables Directly Under Units, to Secure Model Drafting Room With 35 Foot-Candle Intensity



Placing of units near the center of the tables imitates daylight conditions and obviates even diffuse shadows on the working plane

MIXING the artificial light with daylight, and placing the units with respect to the location of the working tables rather than with reference to ceiling squares or area, are the unique features of the indirect-lighted drafting room of the new office building of the Boeing airplane factory in Seattle. Eighty-eight units each containing a 300-watt lamp are installed in the room, which is 220 x 45 ft. in area, to secure an average intensity of 35 foot-candles on the working plane with a variation of not over 1½ foot-candles.

The building was designed and erected by Austin & Company, engineers and architects, Seattle, who consulted with Lyman D. Morgan, illuminating engineer of the Pittsburgh Reflector Company, of that city, on the lighting installation.

In the design of the building preferential location was accorded the drafting room so that advantage could be taken of all the daylight available. The room has large window areas along one side and the two ends and has overhead skylights along 60 per cent of its length near the wall opposite the side containing the windows.

A study of weather reports revealed that during certain periods of the year daylight could not be depended upon for illumination, so that it was deemed necessary to provide artificial illumination of high intensity to supplement the daylight. This meant a predetermination of the average amount of daylight available and the installation of the type of artificial illumination best capable of mixing with the daylight so that the room would not appear obviously artificially lighted, and so that the eye would function under the artificial light just as it does under daylight.

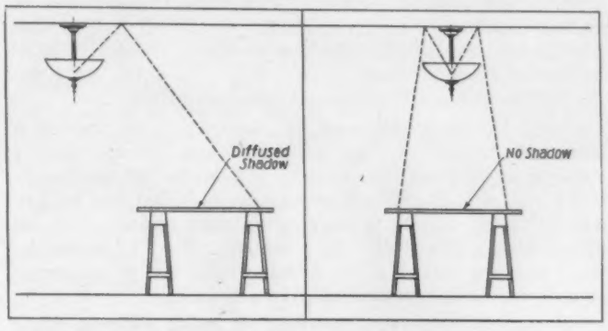


Diagram illustrating how placement at one side causes rays to fall at an angle which will create a diffuse shadow at the edge of a triangle or T-square

Using the results of tests on eye efficiency under different types and intensities of illumination produced by Dr. C. E. Ferree of Bryn Mawr University and other eminent scientists, it was determined that indirect lighting with an intensity of 35 foot-candles would best meet the particular conditions existing in the installation under consideration.

A special bowl fixture containing a Permaflector was furnished by Dwyer & Rhodes, Seattle, for the installation. This fixture, hung 30 in. from the ceiling on 11-ft. centers in one direction and 10-ft. centers in the other, produces 35 foot-candles using 300-watt lamps, or 50 foot-candles using 500-watt lamps. It is expected that if the ceiling and walls get dirty the general level of illumination can be maintained by increasing the wattage of the lamps used.

The placement of working tables in the room necessitated a peculiar spacing of the fixtures with respect to the side walls. On one side the row of fixtures is 4½ ft. from the wall, and on the other 7½ ft. Such arrangement removes any possibility of diffuse shadows developing from the use of T-squares or triangles on the tables.

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"SELLING FLOODLIGHTING"—An analysis of the possibilities and load-building features of floodlighting, with the applications for which floodlighting campaigns might be successfully conducted, and with the sales organization and methods of promotion best fitted for this class of activity, is contained in a booklet, "Selling Floodlighting," just released by the Commercial National Section of the N.E.L.A. Especially now, with many new buildings being erected and with building managers inclined to favor this type of electrical advertising, is the time best suited to the promotion of floodlighting equipment.

Industrial

Oil Seepage Causes Commutator Failures

By W. O. HURLBUT
San Francisco

SYSTEMATIC recording and observation of commutator failures has led to the conclusion that, in the majority of cases, the primary cause of breakdowns can be attributed to seepage of oil from the bearings. Most records were made from motors in elevator service subjected to rotation reversal, although unidirectional machines showed identical tendencies.

While dynamo oil, if clean, is not sufficiently conductive to short the average commutator, it was considered as a medium for the accumulation of particles of conductive dust, chiefly carbon from the brushes, until a conductive bridge across the bars was formed. As such dust cannot adhere to a dry commutator while rotating, oil is blamed as the primary cause of shorts brought about by pitting.

Prints taken from the burned segments of various repair jobs show quite a marked similarity in development of burned areas, and from this it appears that a tenable theory as to the primary cause of failure can be formed. Chart No. 1 of pitted segments which caused failure is chosen as typical. It was taken from a 50-hp., four-pole, 220-volt, 800-r.p.m., 152-bar commutator, parallel connected and equalized at 8 points. About 90 per cent of the segments were pitted at the corner in this manner and at one point the charring had progressed into and through the mica V-ring, grounding and putting the armature out of service. Although this commutator had run for many years and had been turned down many times, the need of frequent turning was no doubt due mostly to flat spots developing from the sparking of shallow pits.

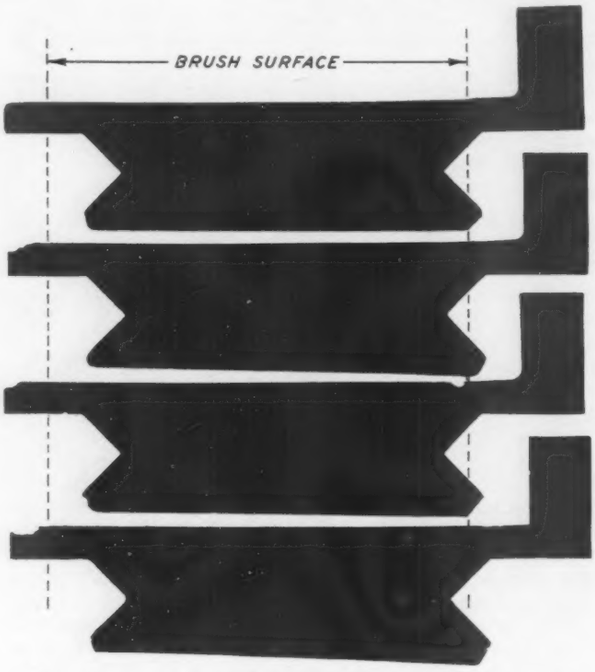

Chart No. 1. Obsolete 50-hp. machine with .036 in. clear india mica segments. Breakdown to ground occurred at outer V-ring. Small pit inside brush line is uncommon

It appeared that oil seeping from the bearing had remained as a dust collector at the outer edge of the bars, but close inspection of the bearing housing and shaft did not lead to a positive method, of reasonable expense, whereby this fault could be remedied.

A new commutator was made and 0.040-in. No. 3 micanite plate used for segments instead of 0.036-in. clear India mica as in the old commutator. The outer corner was well rounded at about a ¼-in. radius and the entire commutator, except the active bearing surface

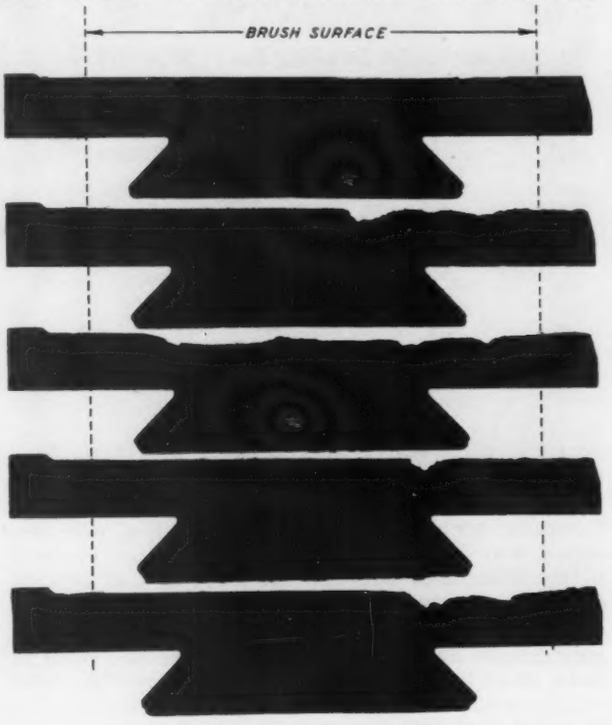

Chart No. 2. Typical case of pitting in which coils were burned out by local current

under the brushes, was well coated and sealed with oilproof enamel.

Records of commutators with well rounded outer corners have revealed that breakdowns at this point are rare; the tendency of pitting favors the position at the outer edge of the brush-wiping line just adjacent to the active commutating surface. This was thought due to carbon dust adhering most readily to the oil film at this point while the brushes themselves wiped the active commutating surface clear. Chart No. 2 is a typical illustration of this seemingly most common failure.

Chart No. 3 is taken as an illustration of tracing a cause of the failure of a job which had had a complete renewal of all mica four months previous. As the breakdown was wholly internal it was decided that the failure was probably due to a piece of foreign matter, such as metal dust, accidentally being sealed in the "V" when the work was assembled. This demonstrates the great necessity of care and watchfulness in assembling.

Pitting once started usually continues to progress until eventually a low resistance short is established between bars, and local current overheats a coil; or the pit progresses into and through a mica V-ring until a low

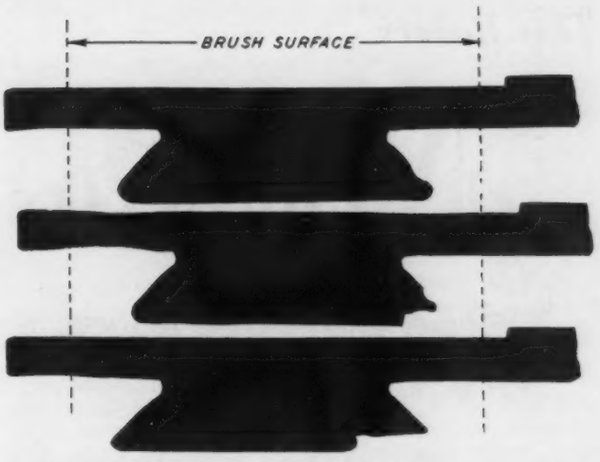

Chart No. 3. An internal ground developed in V-ring because of defective assembly

resistance ground is developed. In either case a breakdown is the final result.

When pits are discovered in time their further development has been forestalled by scraping out the crevice with a hacksaw blade and filling with commutator cement. There are many cements on the market which will easily withstand the maximum voltage between bars. Unfortunately, however, it is not always an easy matter to remove all traces of carbonized material from a crevice before applying the cement. In many cases the cement is applied unknowingly over hidden carbonized mica and pitting again develops under the cement. Also, many cements are conductors until thoroughly dry, and enough time must be allowed, therefore, especially in deep crevice repairs, for this drying to take place before the machine is put in service or even subjected to a potential stress between bars in testing.

Tightness of the assembled bars has been found to be of utmost importance. However, most bolted commutators have proved weakest in the bolts, which often stretch or are stripped. To avoid this, original USS bolts have been replaced, when repairs are made, with S.A.E. machined bolts. This change seldom has been necessary with larger machines. Also, when bars are thin and narrow between the bottom points of the V-grooves, the copper sometimes stretches and bends as the V-rings are forced over the tapers, with the result that the mica segments are broken and pulled apart.

Stubborn skewing or twisting of the bars as the nut is tightened is often an annoying problem on some types of small commutators. One positive method of preventing this is to fit a small key in the commutator hub and slot the V-ring to fit over the key so as to prevent the ring from being turned by the friction of the nut. When the core construction is such that this cannot be done conveniently the assembled bars can be banded under heavy tension before the nut is thoroughly tightened. About 500 to 700 lb. tension at the pulley of a running band of steel banding wire is used on an 8-in. commutator, the band being run back and forth about three times while the tension is retained. While this band itself does much to tighten the commutator as well as to prevent skewing when the nut is finally tightened, difficulties are encountered in its use. If the bars are not of equal depth and the assembly is round and true on the inside the high bars will bear most of the band pressure and will pull down so that the inside of the "V" surface will no longer be true and all of the bars will not present a surface to the tightening V-ring. That is, the outside surface will tend to become round at the expense of the inside when it is of first importance that the inside surface should remain true.

Difficulty is also met with in heating with a flame a banded commutator for progressive tightening, without injuring the band. Heating in an oven in most cases has been necessary in handling such jobs.

It appears reasonable that a normally loaded commutator having run a year with reasonable wear should, with proper care and attention, continue to run more years unless some disorder such as oil seepage causes pitting, high bars, flat spots, seemingly mysterious brush trouble, unequal wearing of the commutator surface and, in the end, burnt-out coils.

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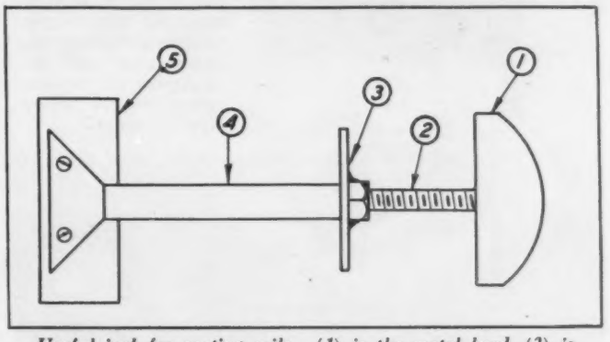
Making Heavy Coils Yield

MOTOR repairmen, experienced in winding low-voltage, open-slot motors, whether armature or stator, have probably become exasperated when stiff heavy coils refused to stay in place so that the retaining wedge might be driven. The use of a greater cell thickness, intended to further tighten the coils in an attempt to prevent their rebound after each blow of the fiber and mallet, sometimes results in damaged insulation.

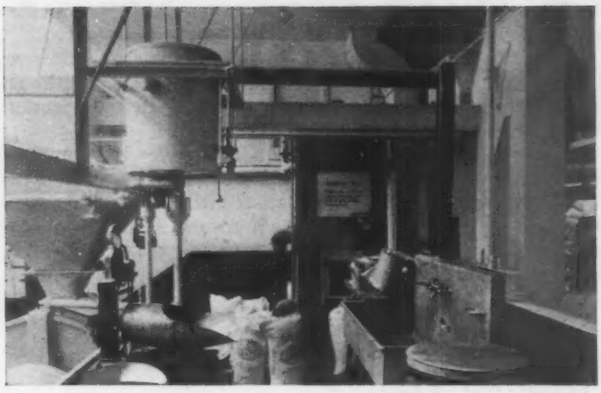


Useful jack for seating coils. (1) is the metal head, (2) is the threaded screw which turns on welded nut (3) into hollow tube (4). (5) is the fiber block which is placed against the coil. The stop mentioned is indicated in the fiber block, allowing the coil to be driven only the distance between the end of the fiber and the bottom of the stop

Ease of manipulation of such coils can be obtained by maintaining a.c. or, preferably, d.c. current across the terminals of each coil as it is being driven. The current should be heavy enough to heat the coil internally as well as externally, softening the insulation and destroying much of the springiness of the coil. The softened insulation allows the coil to form itself in the shape and size of the slot as top pressure is applied. In addition, the current sets up a strong magnetic action which tends to pull the coil deeper into the slot and hold it there.

When coils have been reinsulated and are to be replaced on an emergency job where no steam press is available for sizing the slot portions, a tool in the form of a jack, as illustrated, has been used. This is a powerful tool capable of crushing coils with little manual effort, however, and it is advisable to arrange a stop so placed that additional pressure will be borne by the teeth of the core after the coil has reached the desired depth. A simple stop is indicated in the diagram.

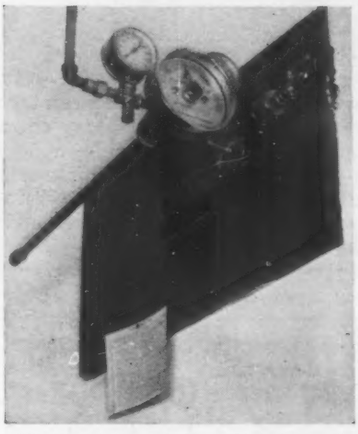
Though the practice is fundamental and self-evident, it is of importance that all slots be thoroughly cleaned so that all available space may be utilized and equal pressure applied over all the coil.



This Bakery

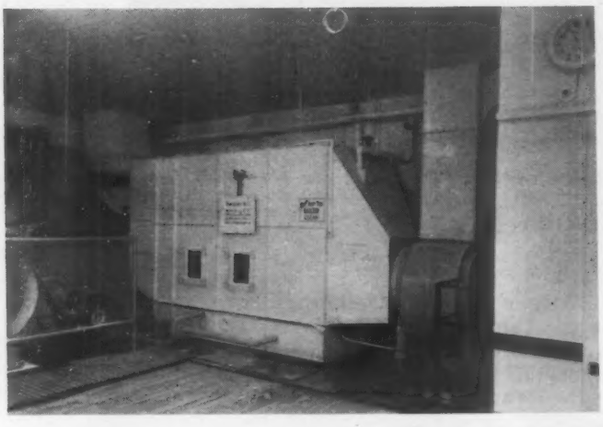
Makes Its

Although Imperial Valley Is Usually Warm Enough, It Is Humidity That Helps Bake Good Bread



Above: On the ingredient mixing platform the first humidifier is located (marked by the placard at center). It serves the fermentation room adjoining

Left: Wet bulb thermometer which automatically controls the temperature and humidity in the fermentation room where dough is raised



CLIMATE can become too much of a good thing. In the Imperial Valley, that dammed off portion of the Gulf of California which has become first a desert and now, with Colorado River water, a garden, the well advertised California climate has outdone itself. Nowhere in the United States, perhaps, does such high temperature and such low humidity exist in combination in an inhabited area.

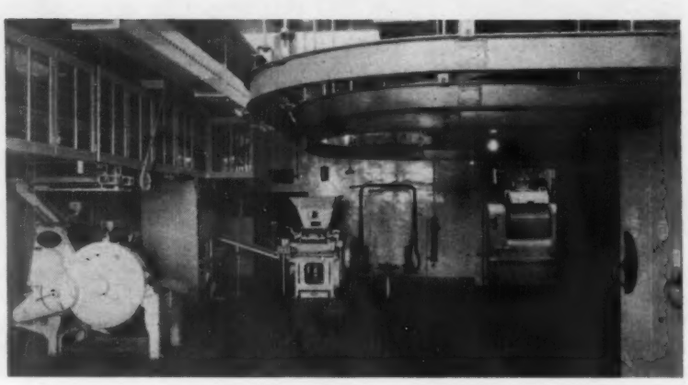
Ordinarily in the past climate has not been considered a detriment to certain kinds of manufacture, but in the baking of bread it is a very necessary factor to be considered. A process which depends upon moisture and temperature for the propagation of yeast spores, as in the so-called "raising" of bread dough, is seriously affected by climatic conditions. Hence, in Imperial Valley it has been practically impossible to bake bread on any commercial scale in the past. Nearly all bread consumed had to be shipped in by truck or train from San Diego or Riverside.

With the manufacture and control of air conditions now possible through the employment of electrical refrigeration, humidifying and ventilating equipment, Cramer's Bakery, of San Diego, has been able to erect a plant in El Centro from which it can bake and deliver 50,000 loaves of bread in a week of six days. As in its San Diego plant (see ELECTRICAL WEST, Nov. 1, 1928, p. 278), all equipment is electrical, including the bake oven, and was installed by the California Electric Works of San Diego.

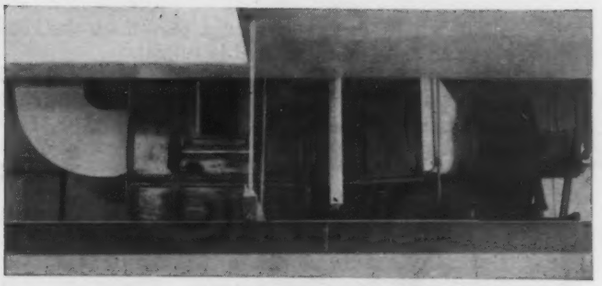
The bakery is housed in an especially built, earthquake resistive, insulated building, one story in height, of concrete, with wooden floors and roof designed to insulate the interior from the sun's heat and be fire resistive as well. A white asbestos roofing, topping four inches of insulation, reflects as many of the sun's rays as possible. Between roof and ceiling are a 6-ft. air space. Exhaust

Above: Refrigeration compressor at the left and No. 3 humidifier which conditions the air for the interior of the bakery in general, maintaining a comfortable 80-deg. coolness when outside temperatures are from 115 to 120 deg.

Right: Here the portable troughs filled with raised dough are rolled in and raised on an hydraulic hoist (center) to the level of the divider. Divided loaves are conveyed to the rounder and raised to the glassed-in proofing chamber above. Note the perforated air duct running parallel to the proofing chamber



Own Climate



motors and blowers are mounted on the roof to eliminate heat. Air intake blowers and motors, however, are nearly all placed inside as a unit with the humidifying equipment.

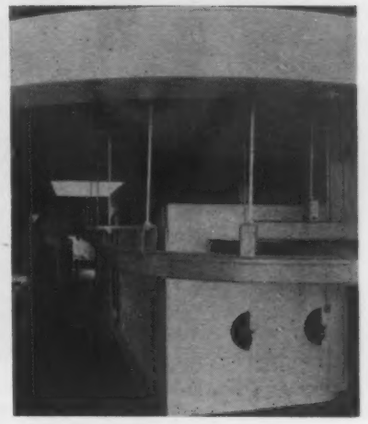
Humidifying and air conditioning equipment provides the breath of existence to this plant. Without it there could be no plant. Hence the four Booth Engineering Company humidifiers, supplying the specific air conditions required by various parts and operations of the bakery, are its outstanding features. Moreover, four times average demand capacity was installed at the beginning, allowing for expansion, extraordinary conditions, or even shut-down of some equipment.

Fermentation room conditions, where the mixed dough ingredients are raised, are most critical. A constant 86-deg. temperature and 64-deg. humidity is maintained by means of Taylor air pressure instruments (checked by ordinary wet and dry bulb instruments constantly) which actuate humidifier No. 1. This machine employs a 1½-hp. blower and a 2-hp. pump. Refrigeration is supplied this and the three other humidifiers from a 40-hp., 20-ton ice machine, which also serves refrigerated brine for a cold-water tank, a cold-storage room for yeast, milk and shortening, and another for waxed wrapping paper.

Another humidifier serves the final proofing tunnel, a long chamber in which the bread loaves in pans are conveyed by monorail for a certain definite period of time. This proofer is located between the make-up room and the electric oven. The humidifier employs a 1-hp. blower and a 2-hp. pump.

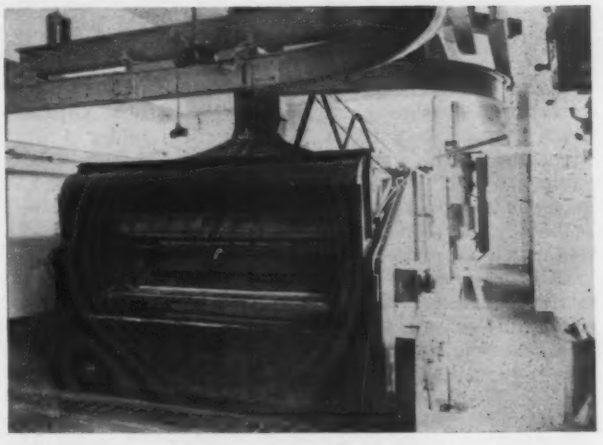
The third humidifier is the largest and serves to condition the air for all of the plant rooms, including offices, storage, flour, mixing and wrapping rooms. It uses both a 5-hp. pump and a 5-hp. blower.

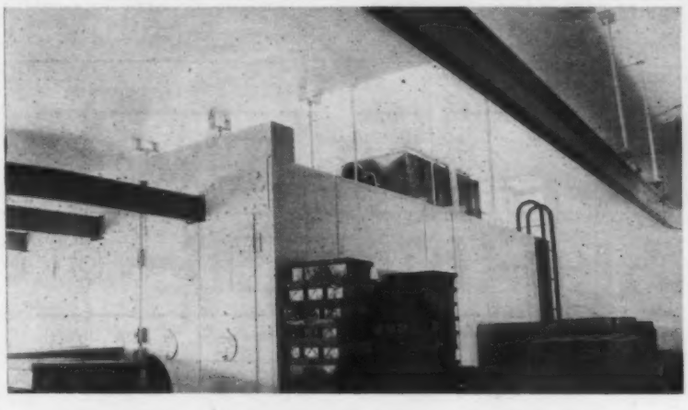
Last of the humidifiers is that used to cool the bread after it comes from the oven before wrapping for delivery. A 3-hp. blower, with a 3-hp. pump, serves this unit, which draws in fresh air from outside, washes and refrigerates it, and blows it into the cooling tunnel at a point near which the loaves are removed for wrapping. Thus the cold air is blown first over the coolest loaves, back over the hottest loaves just entering, and exhausted



Above: The final air cooler, mounted on top of the bread cooling tunnel shown below at right. Air is brought in from the outside, washed and refrigerated, passed over the hot loaves of bread, and exhausted outside

Right: The bread cooling tunnel. Cool air is fed in at the discharge end, or over the coolest bread, and back to the charging end, where the bread is hottest. An exhaust blower on the roof draws off the hot air at that end.



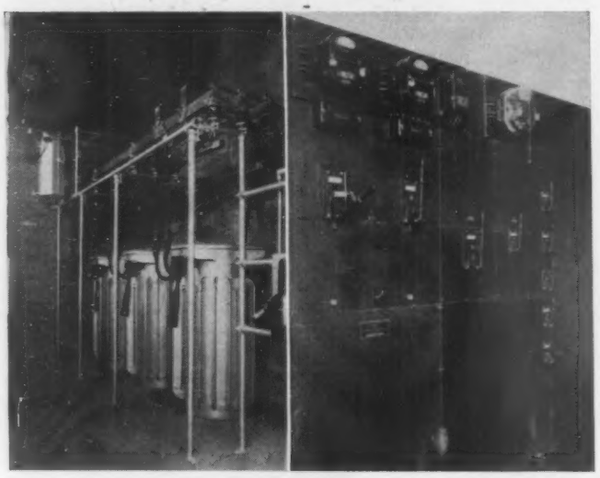


The 200-kw. Rainier single-lap, tray-type electric oven which is charged and unloaded from the same end. Note the cold air duct in the floor in front of the oven to keep the operator cool at this warmest spot in the plant. An exhaust fan in the ceiling draws off the warm air quickly

Left: Final proofing box, in which the loaves in racked pans are kept for a short time before baking. The humidifier can be seen on the top of it. Monorail conveyor systems will have been noted in all pictures

to the outside air by means of a 2-hp. blower on the roof located over the charging end of this tunnel.

Two other notable cooling features are incorporated in the layout. The first is a duct in the floor at the front of the 200-kw., 3-phase, 220-volt, 60-cycle tray-type traveling oven. An air compressor is used to blow cold air up from this duct over the bakers so that they may load and unload the oven in comparative comfort. An exhaust fan, ½-hp., located on the roof just above, draws off the



Transformer room, opening only on the outside of the building. The main switchboard (right), mounted on the opposite side of the partition, is fed directly by buses through the wall. Two meters will be noted, one for day load, the other for night off-peak load, with a time switch which actuates the throw-over

heated air immediately and thus materially decreases the load on the refrigeration system.

Bread having been taken out of the pans and placed on racks to go through the cooling tunnel, the pans are given a quick cooling by pushing them under a hood connected to the cold air duct. On the operation of a damper a flood of cold air descends on the pans and quickens the cooling so that they may be used again more readily. This reduces the stock of pans necessary as well as speeds production.

Other interesting electrical features include the usual mixing, molding, rounding and dividing machinery, electrically driven, with a spare mixer on duty. There is an electric pan greaser, by which whirling brushes grease pans ready for loading with weighed and shaped loaves. There are wrapping machines which wrap and seal the finished loaf in waxed paper. There are two elevators; one to raise the flour sacks and other supplies from the floor to the mixing platform, the other a hoist to raise the large metal raising troughs to dump the dough into the divider.

Electric distribution is provided at four locations. The main switchboard backs to the wall of the transformer vault, located on the outside corner of the building where The Southern Sierras Power Company connects. From it are controlled the oven heating feeders, the oven exhaust fan, oven travel motor, and the main air compressor, as well as the subpanels.

In the make-up room proofer, conveyor, molder, rounder, divider, pan greaser, and one humidifier are controlled at another panelboard. In the refrigeration and mixing rooms, all other power, with the exception of the wrapping machines, is controlled. A separate distribution center for the latter is adjacent to the delivery department. The total motor load is 137½ hp. in 3-phase, 220-volt motors.

Baking begins at 3 p.m. and continues during the night, to take advantage of an off-peak rate. Two meters are installed on the main panel, one to register consumption between 7 a.m. and 10 p.m. on regular power schedule and the other to register from 10 p.m. to 7 a.m. on off-peak schedule. A time clock automatically cuts over the metering at the required time. The average oven heating cost per kw.-hr. is about 1.6 cents under this arrangement, according to H. B. Cramer, manager of the company.

L. A. Madden, local manager, sets the average output at 50,000 loaves every six days, though it will be possible easily to bake 20,000 loaves a day whenever necessary. The biggest advantage to the company lies in the fact that it can deliver throughout the entire Imperial Valley and to Yuma, Ariz., from a central point instead of hauling its product 280 miles, from sea level at San Diego, up over a range 4,000 ft. above sea level, and back down to below sea level to the floor of the valley.

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Measuring Power Factor With Simple Instruments

By Otto Wiemer, Engineer

PREVIOUS articles have dealt with various phases of power factor correction based on the assumption that a condition of low power factor is known to exist. In the larger plants of 500 hp. or over this knowledge may have been discovered from the power bills which have carried the rate penalties under the new P-1 schedule already quoted in a previous article. In the smaller industrial plants excessive power bills may point towards a reasonable suspicion of the same trouble. But the only positive way of settling the matter definitely is to measure the actual power factor of the individual motors or groups of motors, as well as of the whole system, under operating conditions. Therefore, methods of power measurement will now be in order.

The choice of measuring methods will depend primarily on two important considerations: First, the purposes for which the tests are used; and second, the instruments that are available for tests.

With the power companies the importance of accurate metering is such a vital factor in their revenue that they are very elaborately equipped for almost any purpose or method. In the case of the manufacturer, the most important considerations are the design and operating guarantees of the equipment he manufactures and this calls for elaborate laboratory as well as commercial instruments.

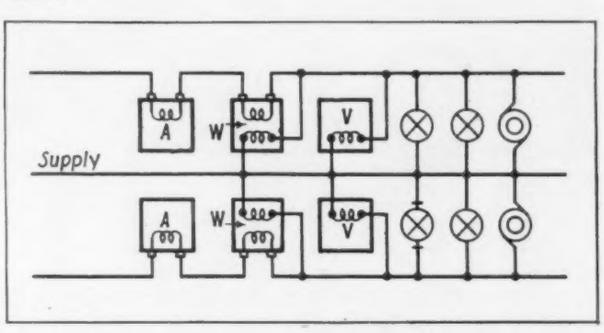

Fig. 1. Instrument connections for measurement

The work of the motor specialist does not call for a duplication of the tests made by the power companies and the manufacturer but demands those for recommending power factor correction in the field of maintenance. Yet it is becoming more and more necessary for him to be equipped with at least some metering equipment and a great deal of ingenuity and resourcefulness to get along with the few instruments he has or that are available.

The first instrument for power factor measurement is a power factor meter. However, this is a one-purpose instrument and different types are required for single-phase and polyphase use. Nor is it so well adapted for use with instrument transformers and other auxiliary equipment for use on the wide ranges of capacity that are required for portable use. It is very convenient for switchboard use, but only after more important instruments which can be used for other purposes are supplied.

The definition for power factor is the basis for most methods of its measurement. The most common definition, as previously stated, is the ratio of actual power (measured in watts) to the apparent power in volt-amperes. The ratio of course is not changed by measuring kilowatts (kw.) and kilovolt-amperes (kva.). In

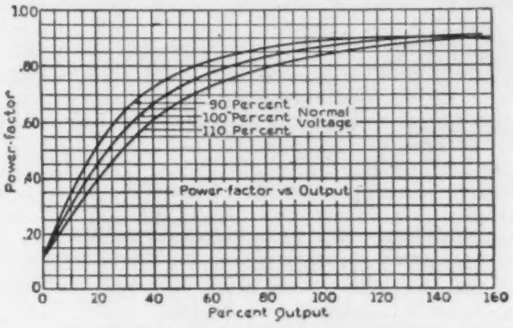

Fig. 2. Curve showing power factor ratios to wattmeter readings. Characteristics being the same regardless of rating of the induction motor, readings may be made from this curve by finding per cent output and scaling to operating voltage

the case of single-phase circuits it is therefore necessary only to measure these quantities with suitable voltmeters, ammeters and wattmeters under operating conditions and then to calculate the power factor by applying the well known formula:

$$\text{Power Factor} = \frac{\text{watts}}{\text{volts} \times \text{amperes}} = \frac{\text{kw.}}{\text{kva.}}$$

For single-phase, three-wire circuits it is evident that the power factor in each of the two legs from line to neutral may not be the same, as is the case when single-phase motors are operated on 110-volt lighting circuits. In that event, it is necessary to connect two single-phase wattmeters and ammeters to the two outside wires and connect the voltmeters and potential coils of the wattmeter between the outside wires and neutral as shown.

The power factor for each leg then is calculated by the single-phase formula. It will be the same for both legs only when the circuits are balanced with respect to all measurements. With unbalanced load, a single value of power factor is meaningless, but an arithmetical average.

The method of connection shown in Fig. 1 is known as the two-wattmeter method. It is the standard method of connection for all load tests on three-wire circuits, regardless of whether they are single-phase, two-phase, or three-phase, with balanced or unbalanced load. Except in the case of three-phase circuits, the power factor is figured separately for each set of instruments by applying the formula for single-phase power factor. For three-phase circuits a special formula which includes the factor 1.73 has to be used, as follows:

$$\text{Power Factor} = \frac{\text{watts}}{\text{volts} \times \text{amperes} \times 1.73} = \frac{\text{kw.}}{\text{kva.} \times 1.73}$$

For three-phase loads that are approximately balanced, as usually is the case when using the two wattmeter method, power factor can be determined in a much simpler way from the wattmeter readings only. This method is based on the fact that the ratio between the readings of the two wattmeters bears a definite relation to the power factor. For instance, when the power factor is 50 per cent one of the wattmeters will register zero and the other the total load. The power factor corresponding to other ratios of wattmeter readings can be determined from the accompanying curve. (Fig. 2.) Ammeter readings should also be taken as they give an indication of the relative load as compared with the rated full load current. Since the load current in turn depends on rated line voltage, voltmeter readings should also be taken.

What has been said so far applies to the indicated power factor. It has the limitation that it shows only the power factor at the moment the readings are taken, and the power factor calculated from those readings applies only to that load. For another load, the power factor will change and similar readings have to be taken again for that load. It will be seen readily that such data are not adapted for a basis of rate adjustment where both the amount of the load and the time it is carried are changing continually. For that reason, rate adjustments have to be based on a power factor that takes these varying conditions into account. Such power factor, called the weighted average monthly power factor in the California P-1 schedule, is determined from the watt-hour meter readings by a different method which will be described later.

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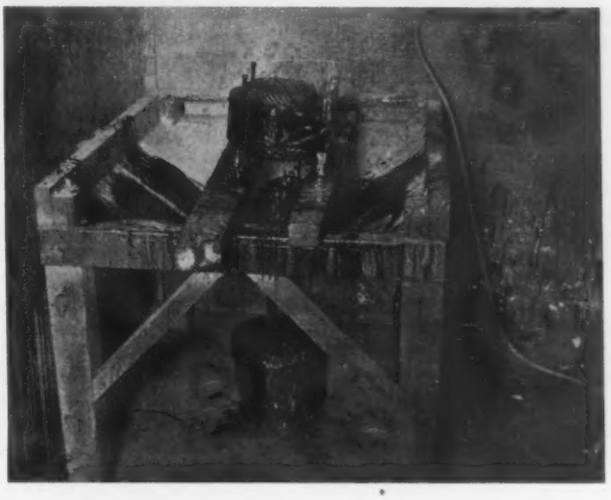
Draining Varnish

Draining of insulating varnish sometimes provides a problem for the motor shop, but in the case of Norton & Norton, Los Angeles motor specialists, the problem was solved by making the table shown above. A metal funnel-shaped surface allows the surplus varnish to drain into a receptacle placed underneath the table, as shown in the illustration. The varnishing is done in a closed and fan-ventilated spray booth.



Commercial

Give Dealers Profit

And They Will Give the Central Station the Load

By J. C. PLANKINTON
Sales Manager, Northwestern Electric Company, Portland, Ore.

OFTEN I feel that we talk and write of our difficulties too much. However, I am tempted to offer a suggested change in national pricing policy on the full line of electrical appliances as an aid to alleviating the present much discussed grievance of dealers against central station mechandising practices.

We have long since learned that our best advertisers are our satisfied customers. Therefore, it should be our sincere aim to satisfy our dealers as nearly as possible in their insistence upon a place in the picture of retail distribution of electrical appliances. We all know that the most satisfying result to a retailer of any line is volume with a margin sufficient to leave a reasonable net after deducting all expenses. Whoever heard of a merchant showing any displeasure at handling any item that was giving satisfactory volume and putting net profit into his operation? On the other hand, what dealers or classes of dealers are going to push actively or be happy in selling items that are a drain on net after taxes?

There is no doubt that the central station, because of its greater interest in putting on its lines current-consuming devices, is the logical agency for the manufacturers to look to in carrying on the very necessary early pioneering effort in selling and popularizing these devices. Yet, if ever these electric home servants are actually to be placed in our consumers' homes in numbers commensurate with their usefulness, we must have the full co-operation, active participation, and vigorous effort of all dealers in the selling of electrical appliances. To put this into effect we must begin to shape our policies to this end. I am sure, if we honestly and faithfully do this, that we shall have solved our dealer-central station merchandising problem.

The bringing about of this condition, in my judgment, will not require that the central station lessen its own merchandise sales activity at all. I am sure that the thoughtful dealer would agree that for the central station to discontinue its sales effort would be a step in the wrong direction, and one looking away from our common goal of greater electrical appliance volume for the dealer, central station and manufacturer.

It is well known that the furniture dealers, department stores, hardware dealers, contractor-dealers, and other outlets, are in the business of buying and selling for the sole purpose of making money, and they are going to devote the greatest amount of space, effort and push to selling those items that produce for them the greatest amount of profit.

In order to place electrical appliances of all sorts, including small appliances, electric ranges, electric refrigerators, electric water heaters, washers, ironers, and other appliances among those items which are to receive preferred attention by the dealers, there must be a widening of the margin between their cost to the dealer and his selling price. If this margin can be arrived at through greater discounts, this, of course, would be preferred to raising the list or retail price.

When it is considered that today electric service plays a most important part in the very life and comfort of every home to which it is available, is there any conceivable reason why those devices whose use in the home is so necessary to the complete utilization of this service should not be a major part of the dealer's sales volume instead of a mere side line, as is the case in most stores today?

This greater margin, if available, would also permit the central station to make a profit in merchandising and thus take away the principal criticism against those utilities which are now operating this department at a loss.

It may be argued that an increase in selling price, if found necessary, would offer sales resistance. I do not believe this would affect sales in any way if price adjustments upward were made universally. Only through comparison does the price of particular articles become a factor. In our own experience we have seen prices on electric ranges raised from little above cost to list in two price changes without affecting sales.

Just recently eight of our principal home furnishings dealers in meeting were interviewed for the purpose of determining their attitude toward the sale of electric ranges. Through this group probably 90 per cent of all the equipment going into the homes of Portland is sold. With the exception of one dealer, all were pushing gas range sales in preference to electric.

However, in the face of this attitude, the dealers are putting on the lines of the power company one-third of the total ranges connected each year. The total yearly connections from all sources amount to approximately 3,000 electric ranges. The total now in operation is about 22,000, or a saturation approaching 30 per cent. There is little doubt in my mind that the sales actually made each year by the dealers are very largely a result of popular demand by the purchaser for the electric range built up by the power company and through so many satisfied users, rather than through any particular effort on the part of the dealer.

What a difference there would be in the total number of electric ranges sold in Portland each year if every dealer said to the prospective range purchaser: "Yes, this electric range is the cooking device you should buy." One does not have to draw on his imagination very much to marvel at the number of electric ranges actually sold each year in Portland, when it is known that 98 contacts out of each 100 made by the prospective range buyer with the dealer are known to be favorable to the gas range, if not absolutely opposed to the electric. I may say that I believe dealer conditions in Portland are far more favorable to the electric range than those found in most other cities of the United States.

What a real opportunity we have to build load on our lines with the help of all dealers, but what a slow job it is going to be if we continue to do it all alone!

In discussing with the dealers the reason for their attitude toward the electric range, they say very frankly that "there is no money in selling them; why, therefore, should we pass up the profit from gas range sales that we have enjoyed for so many years?"

Show the dealer a profit in the sale of electric appliances and he will be with us.

A Million Refrigerators In 1931

That Is the Plan of the New Electrical Refrigeration Bureau. But the Bureau Doesn't Sell, so the Local Dealers and Distributors Must Assume the Major Role

TO SELL one million electric refrigerators in 1931 and an even greater number in 1932 and 1933 is the work of the newly created Electric Refrigeration Bureau of the N.E.L.A. and the object of a plan of co-operation between light and power companies, manufacturers, and local dealers. Heading the new bureau, which contemplates spending millions of dollars in national and local advertising during the next three years, is J. E. Davidson, president of the Nebraska Power Company. Emory A. Wishon, vice-president and assistant general manager of the Pacific Gas and Electric Company, is the Pacific Coast division regional director for the campaign; G. M. Gadsby, of the Utah Power & Light Company, Salt Lake City, is regional director for the Northwest division; and Arthur Prager, of the Albuquerque Gas & Electric Company, holds the same position in the Rocky Mountain division.

As a suitable slogan and identification mark for the campaign, the officers have chosen a coin, upon which the words, "An Electric Refrigerator Pays For Itself," are written.

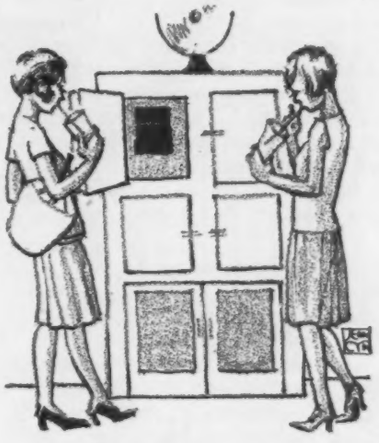
The chairman of the bureau, in a recent statement, avers that it is "the most comprehensive, carefully

planned, co-operative sales program yet undertaken in the electrical industry. . . . Co-operation is the base and heart of this activity—the co-operation of central stations, of manufacturers of electrical refrigerators, of distributors and dealers, and of electric leagues and clubs. If this co-operation becomes whole-hearted and nation-wide, the goal of sales will surely be reached."

All expenses of the national advertising campaign and the organization activity will be borne by the manufacturers of electrical refrigerators, who have subscribed $1,000,000 for the three-year campaign in addition to the regular advertising appropriations. The expense for local advertising and sales promotional activities will be paid for by local interests working together under local co-operative organizations.

Three campaigns are planned, the first in the spring, from April 1 to June 30; the second in the fall, from Sept. 7 to Oct. 16; and the third before Christmas, from Nov. 16 to Dec. 24. National advertising will be concentrated during these periods to provide maximum support to local advertising and selling effort.

In a prospectus which has been mailed to all central stations and others interested in the campaign, the calendar for the first year, 1931, shows that on Jan. 1 local advertising material will be available to all who need it. Field men will be available for contacting local committees on the 15th of the same month. On March 2 plans for the spring campaign will be completed, and the first national advertisement will appear on March 28. The local spring campaigns begin on April 1 and are followed by a succession of national advertisements on



April 11 and 25, May 9 and 23, and June 13 and 27. Plans for the fall campaign will be completed on July 1, and on July 25 and Sept. 5 the eighth and ninth national advertisements will appear.

"Electric Refrigeration Week" begins on Sept. 7, as do the local fall campaigns. Another national advertisement appears on the 19th of that month. On Oct. 1 plans for the Christmas campaign will be completed and two days later another advertisement appears. Holiday sales advertisements appear on Nov. 14, two days before the opening of the Christmas campaign. The last advertisement for the year appears on Dec. 5.

As the sales program contemplates selling electric refrigerators to 5 per cent of all domestic electric consumers in 1931, it is suggested that the contribution of the central station to the local fund should amount to 10 cents for each domestic customer in the community, an equivalent of $2 per refrigerator of expected sales.

Sales promotion material such as window displays, truck banners, and envelope enclosures will be furnished the utility, distributor, or dealer at cost. In this way, they will tie in with the national and local advertising and direct attention to their stores for the actual sales of electric refrigerators. Specific details concerning sales promotion materials or other matters may be obtained from the bureau headquarters in the offices of the N.E.L.A. in New York City, or from the regional division chairmen named in the foregoing.

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FARM LIGHTING BULLETIN ISSUED—"Electric Light on the Farm and in the Rural Districts" is a new pamphlet recently issued by the Edison Lamp Works of the General Electric Company. It treats of the general considerations for farm lighting, the lighting of the farm house, lighting of the farm buildings, etc.

Night Blooming Range Sales

A Sales Talk

By H. J. DREXEL

Presented at the sales convention of Southern California Edison Company, Ltd., Hotel Huntington, Pasadena

Forty per cent of range sales are made at night! This is the surprising fact revealed by an analysis of 1,046 range sales made by nineteen range specialists of the Southern California Edison Company, Ltd. Two cardinal principles stand out as a result of the study: First, sell the housewife the idea of electric cookery; second, call in the evening to close the deal when husband and wife can be interviewed together. The fact that nearly half of all range sales require night closing indicates why the brunt of range selling has been borne by the power companies because of the unwillingness or inability of dealers and dealer salesmen to work at night

MEN in the merchandising department are always intensely, one might say vitally, interested in knowing if there is such a thing as a *best way* and *best time* for making range sales. With that in mind questionnaires were sent out on Sept. 1 to nineteen senior range specialists in the coast and western divisions of the Southern California Edison Company, Ltd., asking a number of questions on how and when each range sale was closed since Jan. 1 (up to and including Aug. 31, 1930). After these questionnaires were returned and the data compiled, some very interesting figures developed, sufficiently instructive to bear analysis. They are presented in the chart on this page.

(1)	(2)	(3)	(4)	(5)
Average No. range sales closed by 19 spec. from Jan. 1 to Aug. 31	Closed bet. 8 a.m. and 5 p.m.	Closed after 5 p.m. or Sat. afternoon	Closed without husband being present	Closed without selling wife first
1,046	634	412	402	91
	or 60%	or 40%	or 39%	or 8%
Six Class "A" Men:				
570	292	278	146	47
	or 51%	or 49%	or 26%	or 8%
Thirteen Class "B" Men:				
476	342	134	256	44
	or 71%	or 29%	or 54%	or 9%

In the first column is shown the number of range sales closed by these nineteen men from Jan. 1 to Aug. 31, 1930, which is 1,046; of this number column 2 shows that 634 or 60 per cent were closed during our regular eight-hour working day. If these boys had only worked our regular day we would have today 634 sales instead of 1,046. Column 3 shows the number of sales closed after 5 p.m. and on Saturday afternoons—in other words, after our regular working day. This work resulted in 412 or 40 per cent of the 1,046 sales, quite a shock possibly to some of us. Column 4 shows the number of range sales closed without the husband being present when the contract was signed, 402 or 39 per cent of the 1,046 sales.

Of the thousands of housewives to whom salesmen sold the idea of electric cookery, and who told the salesmen they would convince friend husband that night and that the salesman could come back tomorrow to get the order, only 402 were able to do it. When the salesman came back the next day the housewife said: "I know an electric range is nice, but we have decided not to buy just now. We can't afford it. Later on, but not now. We will let you know," or one of the many other excuses that are all too well known. It looks as though the salesman had better be there to help the housewife when she starts selling the husband, doesn't it? It looks as though the job is not even half completed when the salesman has thoroughly sold the wife unless he is with her when she starts selling the husband. It would seem that the husband is a very important factor in this job of selling electric ranges. But column 5 shows the number of ranges closed without selling the wife first, 91, or 8 per cent of 1,046 sales. It is quite obvious one does not get very far by working on the husband only.

Not being quite satisfied to form an opinion by placing all nineteen sales specialists in one group, the company divided them into two classes: Class A men and class B men. Class A men are the six men selling the largest number of ranges; class B men are the thirteen remaining.

Now taking class A and going through the same list of questions, the six leading men are shown to have sold 570 of the 1,046 ranges for the period, or over one-half. Column 2 shows 292 or 51 per cent were closed during the regular working day. It will be noticed that this is a lower percentage than the average of all nineteen men. Column 3 shows 278 sales closed after 5 p.m. or on Saturday afternoons, or 49 per cent of the 570. This is above the average by 10 per cent. Column 4 shows 146 or 26 per cent of the 570 closed without the husband being present. It will be noticed that this is 13 per cent below the average. Column 5 shows 47 closed without first selling the wife, or just about the average.

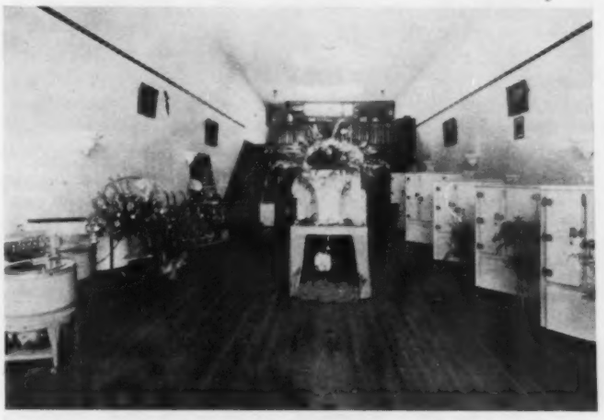
Running through the same columns of figures with the thirteen class B men, in column 1 it is found that these men sold only 476 of the 1,046 ranges, less than half, with twice as many men. Column 2 shows they closed 342 or 71 per cent during the regular working day. This is 11 per cent above the average and 20 per cent above that of the class A men. It would appear that class B men were either working harder during the regular working day or working less after hours. Column 3 shows that class B men closed 134 or 29 per cent after 5 p.m. or on Saturday afternoons; 11 per cent below the average and 20 per cent below the class A men. Column 4 shows that class B men closed 256 or 54 per cent of the 476 sales without the husband being present; 15 per cent above the average and 28 per cent above the class A men. Apparently class B men believed in allowing the wife to sell the husband alone. One can't help but wonder if that had anything to do with their failing to get the order after doing such a good job selling the wife? Maybe they should have been there to help sell the husband. Column 5 shows class B men closed 44 or 9 per cent of the 476 without first selling the wife.

The entire thing simmers down to these rules: (1) Sell the wife the idea; (2) get the husband and wife together; (3) be there with them after supper and close the deal.

Specializing Builds Appliance Business

Vancouver Contractor-Dealer Finds Automobile Selling Methods Strengthen Merchandise Business and Bring Wiring as a Side Line

BELIEVING that the class of people who buy large electrical appliances, such as refrigerators and washers, present a problem not usually recognized by the normal electrical merchandiser, the Jarvis Electric Company, of Vancouver, B. C., has perfected a sales organization similar to that used by an automobile agency. This firm believes that purchases of large electric appliances are not made at the first contact, as is the case with smaller appliances, and so endeavors by its salesmanship and its service to convince these prospects of the fine points of the products which are being sold. Demonstrations, inspections, literature, and all the tactics of a good automobile salesman are used by the Jarvis company in selling its large appliances.



Washers occupy one side, refrigerators the other, and the refrigerator "flower basket" holds the center of the sales floor

Contracting formerly constituted a major part of the firm's business, but, with the advent of years, it was found that this business was dropping off, and that major appliance sales were becoming the chief items of the business. For this reason, the company's position has turned until it now is a merchandising organization primarily and a contracting organization only secondarily.

It was decided recently that a new location should be established. In keeping with its merchandising experience, a location at some distance from the main centers of business was selected. This company has found that a downtown location is not only unessential, but is not desirable in building a business of this type. The location should be central, but at the same time it should be in such a place as to provide ample parking facilities in the district. Windows in the new store of the Jarvis company are practically level with the street and are devoid of backs, permitting an unrestricted view of the store interior to pedestrians and autoists who pass by.

No time is wasted on door-to-door canvassing, but the organization keeps in very close touch with architects, builders, and others in the construction field. All who take out new permits for major buildings are immediately contacted and in this way a large number of contracts are secured for the installation of refrigerator and washing machine units in new apartment blocks, residential hotels, and similar buildings not yet erected. These builders are approached and are invited to call at the Jarvis store. Here they are shown the various models of the appliance in which they are interested.

Only one model of each of the lines is shown on the display floor, for the management believes that thus is added a touch of dignity and an air of exclusiveness which is a considerable asset. An attempt is made to give to the customers the impression that the firm is specializing in this class of merchandise and hence is able to give service in an adequate manner.

This close contact with the building trade also is, of course, of valuable assistance to the electrical contracting department of the store.

Among the features of the showroom is a large central ornament, which appears to be a large bouquet of flowers, but which is really a frosted basket made entirely of copper tubing by the Kelvinator Company and connected to one of its refrigerator condensing units. The ornament, or basket, is not only attractive but offers a good testimonial to the ability and efficiency of the refrigerating units which are sold.

Several leather-back, loose leaf books are placed on tables in the showroom. These books contain the names of all the apartment blocks and all the residences in Vancouver in which the company has installed refrigerators, thus affording one of the best sales arguments for the firm. A few lines of electric percolators, toasters, waffle irons, and other small appliances are shown, but little attempt is made to sell these as they are an added feature of the service which attempts to fill all needs.

Large repair shops with a staff of 22 mechanics are operated in addition to the merchandising and contracting departments. The total staff of the firm is approximately 50 employees.

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Official Action Taken on Radio Interference

RADIO interference caused by certain domestic appliances has been assuming an increasing importance, as evidenced by the action of many cities in passing and enforcing ordinances prohibiting the sale and use of such appliances, the action of many radio trade associations in condemning these appliances through talks over the radio, and the report of the appliance committee of the P.C.E.A. at its recent San Francisco conclave.

Because publicity of this nature will no doubt limit the sale and use of these appliances, such as drink mixers, hair dryers, vacuum cleaners, fans, washing machines, etc., unless steps are taken to equip series-motor driven and thermostatically-controlled appliances with filters and condensers, the executive committee of the P.C.E.A. has drawn a resolution directed to the N.E.L.A. and asking that major body to urge manufacturers to cooperate in clearing up the difficulty. The resolution also indicates that member companies will be solicited to discontinue selling radio interfering appliances. As an aid, the executive committee has suggested the use of a name plate on the appliance bearing the words "Non-radio interfering," the use of the name plate to be limited to those appliances which do not interfere or have been so equipped as not to interfere with radio reception.

Selling Good Health

Every Dealer in Appliances Can Learn Much From the Methods of This Health Specialty Organization

WITH 80 men in the field and a record of 59 sales for every 100 home demonstrations, the Battle Creek Health Appliance Company, of Los Angeles, feels that it has justified its policy of carrying the selling of health appliances into the home.

The company has an imposing building of its own, known in Los Angeles and Hollywood as the Temple of Health, and in addition has several resale departments in the better class of department stores, but the majority of its sales are made in the field.

Not every type of salesman can succeed in selling this type of appliance, according to H. E. Caygill, sales manager in charge of sales for this district. It is necessary that a man who undertakes to sell health motors or sunshine lamps be in the best of health himself. It is advisable that he be between the ages of 25 and 40 and married. The relationship between salesman and customer frequently borders on that between doctor and patient. In cases where the appliance is desired to counteract some deficiency in health, it becomes necessary for prospect and salesman to talk frankly and simply of matters usually considered confidential. The salesman must be of professional calibre, clean minded and tactful, as well as discreet.

No one source for such material has been found. Frequently the most successful salesman will be one who has had experience in other lines of selling and who at the same time possesses the right personality. Or he may have been in some other line of work entirely. Nurses have a good background, but physicians have seldom been employed because the right type of doctor will usually not accept such a position.

After employment, the new salesman goes to school for three days to learn his product and the special methods of health appliance selling. He must know not only how to secure an interview by ringing the front doorbell and how best to close a sale, but also exactly what the appliance he is selling may be expected to do.

One of the most important considerations in health appliance selling is not to oversell the equipment. Neither health motors nor sunshine lamps will perform miracles, and to lead the customer to expect that her weight will be reduced by the use of an exercise motor, the while she goes on living on cream cake and chocolate sodas, is to court disappointment. The salesman is taught to explain exactly the function of his products, and their limitations as well as their possibilities. Factory representatives and company officials pass on the best that they have to give to the new recruit, and then he is sent into the field.

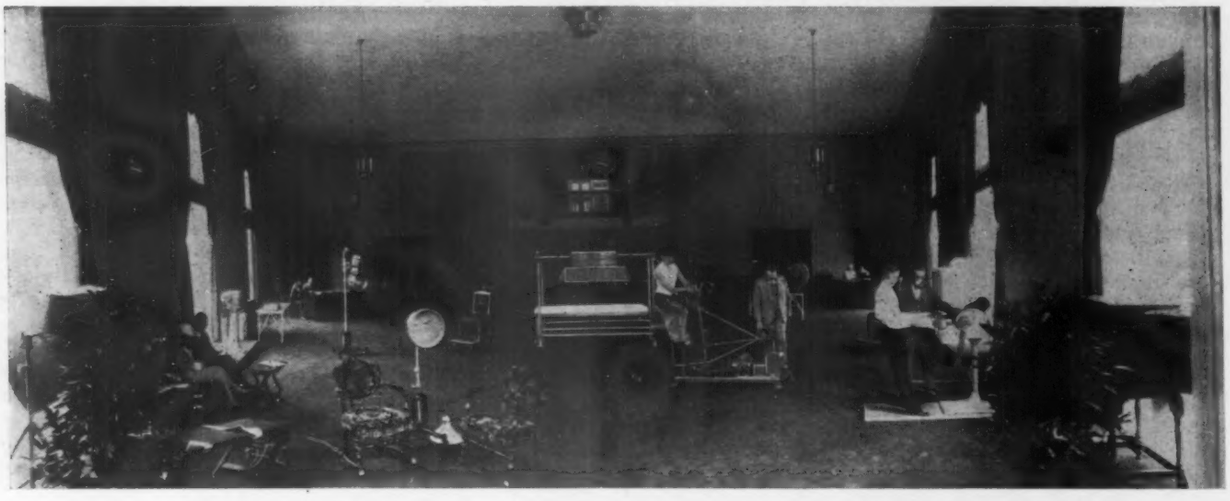
For the first few days he goes out in the company of a veteran salesman, with a list of prospect names which has been furnished him by the office. Later on when he has five placements to his credit, he is turned loose on his own, and before long he is following up his own prospect list and developing his own schedule of calls.

It has been found that the best prospects for health appliances are those who may be said to be already "health minded." Members of women's athletic clubs, for instance, show that they like to take care of their health; they will be familiar with the appliance in the gymnasium of the club and as a rule make excellent prospects. To a lesser degree, patrons of swimming baths, members of outdoor sport organizations, hikers and others who go in for regular exercise are open to health motor sales. These people have shown by the fact that they take regular exercise in some form or other that they are interested in keeping fit; they will listen sympathetically to the virtues of the health appliance.

In addition to this class of the healthy who are interested in motors as a means of keeping so, there is also the group composed of those who suffer from some ailment which will yield to a treatment of exercise and sunshine—the too thin, the too fat, the sufferers from constipation and like ailments. The salesman, of course, will adapt his sales talk to the particular situation he has to face. Here, however, he must observe the greatest caution in confining his statements to the strictest truth. The customer must understand just what the appliances can do for him and should not be led to expect too much. However, within these limits there still remains an excellent sales talk which will not fail to interest the seeker after health and beauty and which will sell.

Among the very best of prospects may be placed those men and women who have had to face the knowledge that they are less than physically fit in some way. Rejects

In this large salesroom, personal instructions are given each customer on the uses and possibilities of the equipment



from insurance companies, those who have been denied a policy, are usually open to health measures if these are tactfully presented in a way to meet their needs.

Failing any immediate prospect list built up from such sources as those listed, it has been found quite feasible to make a door-to-door canvass, with no other recommendation than that the district chosen is one which suggests that the home owners are able to afford the investment.

The first endeavor of the salesman in every case is to secure a home demonstration. For this purpose it has been found advisable to utilize the heavier type of exercise motor fitted on its own stand. This needs no special installation and can be used for demonstration purposes without injury to the equipment. The motor is left in the home not more than three or four days. Experience has shown that 79 per cent of the sales are made within the first three days. It is advisable not to let the novelty wear off but to catch the prospect while there is still a

Fifteen free health treatments are given each purchaser by trained attendants, leaving the machines the task of keeping, not getting, the subject healthy

desire to experiment with the machine further. Of course, under certain circumstances which appear to justify the exception, special arrangements are made for longer demonstrations, but as a rule the salesman calls within three days, and failing a sale at that time, the machine is called for without delay. Fifty-nine per cent of all home demonstrations lead to sales.

Moreover, the majority of these sales are for cash. In the belief that the emphasis should be laid by the salesman on that type of payment which the company desires to foster, the price of the equipment is quoted on the basis of a time payment sale, with a special discount for cash, rather than at the cash price with an additional charge for time. This means that the salesman spends most of his time explaining to the customer the advantages of a cash sale, rather than, as in most cases, simply mentioning the cash price and then taking a longer time to explain the terms allowed. As a result of this system of quoting prices, 55 per cent of all sales are cash.

It has been found beneficial to precede the salesman's call by a postcard announcing his coming. Radio talks on health are also given by the company's officials over a local broadcasting station. These, in addition to the excellent advertising value of the attractive Temple of Health, give a background against which the salesman can paint his picture most effectively. The customer is already familiar with his company and his product and is the more likely to give him a hearing and perhaps also to allow a home demonstration machine to be installed.

With every appliance sold the company gives free a course of fifteen treatments in the well equipped "health rooms" in its main building. As these are of the sort

Men and women are allowed the privilege of "health rooms" with every type of appliance for sale by the company.. This produces not only satisfied patrons, but further sales

for which at least $5 would be charged at any baths or health institute, the salesman has the excellent talking point of this $75 premium to offer as an inducement to the purchase of a machine.

The company has found this policy helpful from many standpoints. Not only does it offer a good sales argument, but it has proved most effective in producing satisfied customers. The element of danger in the sale of health appliances is that the customer will not adopt the proper regime to establish health, but will expect a desultory use of his health motor or lamp to produce a miracle. The course of fifteen health treatments starts out by putting the owner of the new machine in the best of condition physically. Thus the motor starts off under favorable auspices and, wisely used, will produce the results expected of it.

Thirdly, the customer is given practical demonstrations of other health equipment through its use in these treatments. All salesmen are instructed to emphasize the "health room" idea, completely outfitted with health shower, exercise motor, sun lamp and other equipment if desired. The best possible advertisement for this is the attractive individual health room with which the customer becomes familiar during his or her course of treatments. Nor is this knowledge confined to one member of the family. Husbands as well as wives are urged to partake of these treatments, the rooms being given over to women until 5 in the evening and to men from 5 to 9. Numerous additional appliances have been sold to customers who have enjoyed their use in this way, and several complete "health rooms" have been installed in the better class of Los Angeles and Hollywood homes.

Salesmen are required to follow up appliances at least five times after each sale at intervals of two weeks. In the health appliance more, perhaps, than in the case of most other electrical equipment, the satisfied customer is the greatest possible asset. The Battle Creek Health Appliance Company of California spares no pains to bring about the customer's satisfaction. As a result, the greatest source for new prospects is in the names of friends of owners of machines already sold. Which means in the long run a healthy and constantly expanding business.

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ADVERTISING COUNSEL for the small retailer, including tips on the advantages of advertising, the common ratio of advertising expense to net sales for stores of different types and volumes, and practical suggestions for the small store advertiser, is contained in a handbook recently published by the Chamber of Commerce of the United States. Intelligent advertising by the owner of small stores is enhanced by the use of this booklet.

News

Co-operation Award Made to Charles T. Hutchinson

C. T. HUTCHINSON

WHILE he lived, no matter how deserving of the honor, Charles T. Hutchinson could not be given the James H. McGraw Award to Electrical Men for Co-operation. This was because he himself was an executive in the McGraw-Hill Company of California, its president and general manager. Shortly after his death last February many of his friends joined under the leadership of the California Electrical Bureau, of which Mr. Hutchinson had been chairman of the advisory board for some years, and presented to the committee on awards of The Society for Electrical Development, under which the McGraw awards are made, many reasons for the waiving of Mr. Hutchinson's connection with the McGraw-Hill Company and the posthumous presentation of the 1930 Medal for Co-operation.

Letters from leaders of all branches of the industry poured into the offices of the California Electrical Bureau and The Society for Electrical Development, expressing the feelings of associations and commercial organizations that Mr. Hutchinson had done more for practical co-operation than anyone not in his neutral position in the industry could do and had long deserved the honor of the award. All of these urged that the award be made posthumously and as a tribute to his memory.

In the citation, which is reprinted below, a brief summary of the considerations which led the committee on awards to make their decision is given. In itself the citation stands as something of documentary record of achievement in human kindness and moderation.

On the scroll accompanying the James H. McGraw medal and purse of $100 in gold and enclosing the citation, above the signatures of the committee of awards, representing every branch of the electrical industry, are the following words:

"The medal and purse for co-operation are hereby given as a posthumous award to Charles T. Hutchinson in recognition of his distinguished service to the advancement of harmony and co-operation in the electrical industry, through his constructive personal leadership in the development and co-ordination of all branches of the industry on the Pacific Coast." Signed by the committee of awards appointed by The Society for Electrical Development: W. W. Freeman, H. B. Crouse, W. E. Robertson, L. K. Comstock, F. M. Feiker, and Earl Whitehorne.

Presentation of the award was made privately to Mrs. Gertrude A. Hutchinson by a committee consisting of Clyde L. Chamblin and George C. Tenney.

CITATION

". . . . in recognition of his distinguished service to the advancement of harmony and co-operation in the electrical industry . . . on the Pacific Coast"

CHARLES T. HUTCHINSON, president of the McGraw-Hill Company of California, came into the electrical industry from the mining field in 1922, entering immediately into the activities of all the organized groups of electrical men on the Pacific Coast. His genial and appealing personality, his earnestness and sincerity, his sympathetic interest and patient understanding, his frank and helpful friendliness, his sound judgment and wise counsel, his impartial fairness and enduring loyalty, and above all, his unfailing whimsical good humor, won him immediately the respect, confidence and affection of men high and low in all branches of the electrical business in the Far West.

His neutral position as an editor and his natural qualities of leadership soon brought him into intimate relationship with the problems and purposes of the power companies, manufacturers, wholesalers, contractors and dealers alike, and gave him an unusual insight into their achievements, their responsibilities, their perplexities, their aspirations and their ideals. He became deeply interested and actively engaged in the organized activities of each group and in the co-ordination of these group activities for the advancement of the common interests of the entire industry.

He was made a member of the executive committee of the Pacific Coast Electrical Association, an honorary member of the California Electragists, and chairman of the advisory committee of the California Electrical Bureau, responsible for guiding and promoting the development of the electrical market in that state. He was president and chairman of the public policy committee of the San Francisco Electrical Development League and was the originator and chairman of the joint committee for the determination of policy in the inter-relationships between all branches of the industry, sitting also as a board of arbitration in inter-industrial disputes.

In this capacity he was the intermediary between the different branches of the industry, encouraging, restraining and sometimes fighting the battles of their conflicting inter-relationships. Finally, just prior to his untimely death, he devised and perfected a plan for unifying the organization, financing, and operation of the several groups in California on a broader basis of mutual interest, which has now been established. It was the crowning contribution of a career of service that through his editorial writings, his personal contacts, and his broad association activities, has exerted a profound influence on the progress of electrical development on the Pacific Coast.

For the genius of Charles T. Hutchinson lay not alone in his tireless efforts for harmony and co-operation among the electrical men with whom he delighted to work, but in the expression of a broad, practical philosophy of helpfulness in the daily affairs of business life. He brought a spiritual stimulus to men that widened their vision, strengthened their courage, increased their tolerance, and left them richer in character for having known him.

In recognition of this outstanding service to the advancement of co-operation in the electrical industry, and the impressive petition from leaders of the industry in the Far West that his affiliation with the McGraw-Hill organization be disregarded, the judges have voted to Charles T. Hutchinson, as a posthumous award, the 1930 Medal for Co-operation and the Purse given under the James H. McGraw Award, to be presented to Mrs. Hutchinson.

Government Invites Bids for Hoover Dam Construction

BIDS for construction work on Hoover Dam, power plant, and appurtenant works are now being taken, following approval by government authorities of present plans and specifications. All work in connection with the storage and power enterprise, including the coffer dams for river diversion, tunnels, the dam itself, outlet works, freight elevator, power house, and incidental features, will be included in a single contract. Of the $165,000,000 appropriated for the Boulder Canyon project, including the All-American Canal, $108,000,000 exclusive of interest charges, is available for expenditure at Black Canyon, site of the dam.

Principal items of work and advanced estimated quantities are:

1,800,000 cu.yd. all classes of open cut excavation.
1,900,000 cu.yd. tunnel and shaft excavation.
1,200,000 cu.yd. earth and rock fill in coffer dams and river channel protection.
4,400,000 cu.yd. concrete.
228,000 cu.ft. grout.
Drilling 190,000 lin.ft. grout and drainage holes.
Placing 5,500,000 lb. reinforcement bar.
Installing 1,900,000 lb. small metal pipe and fittings.
Installing 32,500,000 lb. large metal conduits.
Installing 10,600,000 lb. structural steel.
Installing 20,000,000 lb. gates, hoists, and other metal work.

The invitation for bids does not cover the purchase of materials which are to be furnished by the government, but the specifications define the materials to be furnished by the contractor and by the government, respectively.

Performance of the contract begins within thirty days after receipt by the contractor of notice to proceed and those portions of the power house and other works which will house power machinery and other equipment must be completed within 1,600 days, slightly over four years. Other work, with certain provisions, is to be completed within 2,565 days, just over seven years. The penalty for failure of completion is $3,000 per day for each part of the work.

Bids will be opened on March 4, 1931, at the office of the United States Bureau of Reclamation, Wilda Building, Denver.

Establishment by the government of Boulder City, Nev., about seven miles from the dam, has been decided upon. The town will be for the joint use of the government and the contractor and their employees, and will provide accessibility to all workers. Many highways and a railroad connecting with the Union Pacific will be constructed by the government.

Until power can be obtained from the plant at the dam, it will be furnished by The Southern Sierras Power Company over a 240-mile transmission line. Orders for 5,000,000 lb. of fabricated steel pole line structures, first material ordered for this construction, have been placed with the Consolidated Steel Company and International Derrick & Equipment Company for fabrication. The Columbia Steel Company will manufacture this steel (45,000 lb. tensile strength) at Torrence, Calif., whence deliveries will be made between Dec. 15, 1930, and March 15, 1931.

Supporting structures, 1,400 in number and spaced seven to the mile, will be of standard H-frame design, two vertical supports carrying a horizontal arm 34 ft. long at a height of 52 ft. Besides these more than 200 special structures will be added to support the line. C. H. Rhudy is the engineer in charge of surveys and E. J. Waugh is the construction engineer.

Genealogy of ELECTRICAL WEST

IN 1887 there was founded in San Francisco *Pacific Lumberman, Contractor and Electrician*, the electrical department of which was edited by George P. Low. As electrical development in California progressed it was deemed advisable to divorce the electrical department from the parent publication. This was done in July, 1895, and the new paper was called *Electrical Journal*, with Mr. Low as editor and publisher. To avoid confusion with *Electrical Journal* founded at about this time by the Westinghouse company in Pittsburgh, Pa., the name of the Pacific Coast paper was changed in September, 1895, to *Journal of Electricity*. The paper was brought out as a monthly under this title until July, 1899, when the name was changed to *Journal of Electricity, Power and Gas*. After the San Francisco fire of April, 1906, the Technical Publishing Company was organized and publication was changed to weekly and continued so to January, 1917, when the schedule was changed to semi-monthly publication. On Jan. 1, 1919, the name was again changed, the paper reverting to the title *Journal of Electricity*. In September, 1919, the paper was purchased from the Technical Publishing Company by the McGraw-Hill Company. On Feb. 1, 1921, the McGraw-Hill Company of California was organized and the name of the paper changed to *Journal of Electricity and Western Industry*. It was found advisable to revert to the title, *Journal of Electricity*, on July 1, 1923. On Jan. 1, 1927, the paper became ELECTRICAL WEST with a monthly publication schedule. The magazine has always been published in San Francisco.

Editorial policies of the paper, first as a department in *Pacific Lumberman, Contractor and Electrician*, and later as *Journal of Electricity*, were directed by George P. Low as editor until early in 1905. He was succeeded by C. L. Cory, dean of the College of Mechanics of the University of California, who held the position of editor until 1907. From 1907 until 1917 the paper was directed by A. H. Halloran as managing editor. In 1917 Robert Sibley became editor, a post he held until Aug. 1, 1922, when he was made editorial director. On Jan. 1, 1923, Charles T. Hutchinson became editorial director and acted in that capacity until his appointment as publishing director just before his death in February, 1930. George C. Tenney, managing enditor of the paper from Jan. 1, 1923, until Jan. 1, 1930, was appointed editor on the latter date and has since been in full charge of the editorial policies of the publication. In addition the present editorial staff consists of W. A. Cyr, associate editor, C. W. Leihy, associate editor, B. H. Snow, Northwest editor, D. D. Peede, news editor, and R. H. Flynn, assistant editor.

Northwest Power Co.-Salem Rights Case Nearing End

The Oregon Reclamation Commission is now awaiting the completion of transcript of final testimony which is to guide the members in determining whether or not the granting of an application of the Northwest Power Company for authority to develop hydro-electric projects on the North Santiam River and at Marion Lake will prejudicially affect public interests, and whether subsequent filings on the same stream and lake by the City of Salem shall be considered in the light of priority rights over those sought by the private utility. (ELECTRICAL WEST, Oct. 1, 1930, p. 211.)

It was brought out at the third and final hearing before the commission held early in December, that the Northwest Power Company, a subsidiary of the Portland General Electric Company, desires to establish additional generating plants on the river and lake, located approximately 116 miles south of the utility's present generators, in order to equalize the industrial and domestic power load between the two points and thus insure more adequate service at possibly a lower cost to consumers in the field bounded by Salem on the south and Vancouver on the north.

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Irrigationists in Accord With Utility on Rates

Adjustment of differences between irrigationists of the Okanogan Valley (Wash.) and The Washington Water Power Company were effected at an informal meeting on Dec. 16 between representatives of the irrigationists, officials of the power company, headed by Frank T. Post, president, and Frank Purse, state supervisor of public utilities at Okanogan.

A written understanding was drawn up at the meeting which provides that for short periods before and after irrigation seasons, rates will be pro rated on the monthly schedule. Removal of Wright demand meters and an interseasonal rate of 2 cents a kw.-hr. were agreed upon, as were also the adoption of a return to a test meter system under which tests are run twice a month, and submission of rate adjustments for 1930 to the Public Service Commission.

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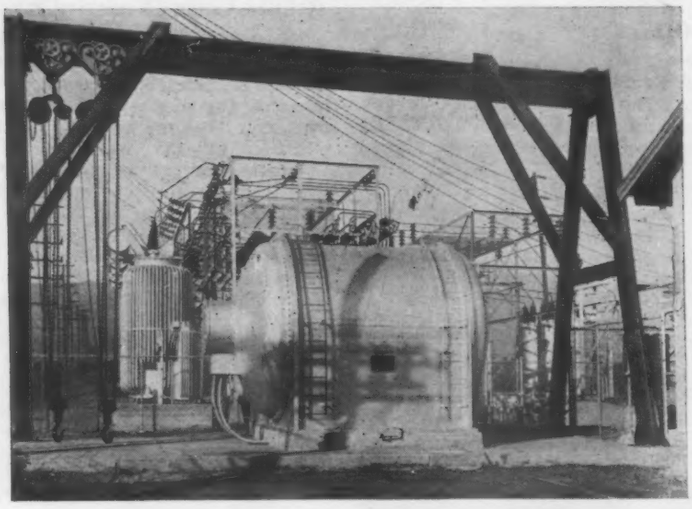
A.I.E.E. NOMINATIONS—The national nominating committee of the American Institute of Electrical Engineers, consisting of fifteen members from various parts of the country, has nominated C. E. Skinner, assistant director of engineering, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., as a candidate for the office of president falling vacant Aug. 1, 1931. A. W. Copley, of San Francisco, engineering manager of the Pacific Coast district of the Westinghouse company, is the vice-presidential nominee from the Pacific district.

Outdoor Condenser Installed on Edison System



THE installation of this outdoor, hydrogen-cooled condenser, first of its kind on the Southern California Edison Company system, has been completed at the San Antonio substation, near Claremont, Calif. The condenser capacity is 15,000 kva., and the cost of installation, including transformers and oil switches, was $170,000. The condenser was manufactured by the Westinghouse Electric & Manufacturing Company.

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L.A. Water & Power Joint Divisons Under One Head

What is considered as the first step toward the reorganization of the Los Angeles Department of Water and Power, was taken by the commissioners on Nov. 25 when the joint divisions of the department were placed under the authority of H. A. Van Norman, chief engineer and general manager of the Bureau of Water Works and Supply. The joint divisions are those such as land purchasing, commercial bookkeeping, and warehouses which perform services for both the water and power bureaus.

For nearly a year past the authority has rested in the hands of E. F. Scattergood, chief engineer and general manager of the Bureau of Power and Light. A clause in the resolution of the commissioners provides that policies affecting the character of service rendered to a bureau are to be determined jointly by the two bureau managers.

Another action taken by the commissioners was the creation of new positions of electrical engineer and assistant electrical engineer in the Bureau of Water Works and Supply and the appointment of Carl Heinze and Carl Chapin, respectively, to the positions. Mr. Heinze, who has been connected with the Department of Water and Power for 24 years, with the exception of the past year, formerly was assistant general manager of the combined water and power bureaus. H. A. Van Norman was general manager under this plan of operation, which was abolished a year ago in favor of separate bureaus. Mr. Van Norman became chief engineer and general manager of the Bureau of Water Works and Supply, and the position held by Mr. Heinze was abolished. Mr. Heinze has been engaged as a consulting engineer during the past year. Mr. Chapin was commercial director of the combined bureaus operating a year ago, and the position held by him likewise was abolished when the present plan of operation was resumed after approximately nine months of operation as one organization.

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Edison Company Revises Line Extension Rules

A revised rule governing electric line extensions has been filed voluntarily by the Southern California Edison Company, Ltd., with the California Railroad Commission. This will result in immediate refunds by the company to its customers of more than $165,000 representing deposits for such extensions.

The new rule, which is retroactive, is more liberal to consumers than the rule previously in effect, and will mean substantial savings to the company's customers in the future.

Following, in feet, are the allowances of the two rules:

	Old Rule	New Rule
For each lighting consumer	150	250
For each refrigerating consumer	150	200
For each kw. of heating and cooking load	60	125
For each hp. of power load less than 5 hp.	75	200
For each hp. of power load of 5 hp. or over	100	250

May Pick California Sites For Projects on Klamath

If the Oregon Reclamation Commission adheres to the advice of Attorney General Van Winkle and declines to exercise jurisdiction in the matter of the application of The California Oregon Power Company for permission to develop hydro-electric power along the Klamath River in Oregon (ELECTRICAL WEST, Dec. 1, 1930, p. 320), officials of the company have announced that the proposed construction will be merely transferred across the line and the developments of projects completed in California territory. The utility's present program for Oregon calls for the establishment of five units along the Klamath River from the Grant power site to the state line, a distance of fifteen miles.

Governor Norblad, as chairman of the commission, asserts that if it were within his power to act, the application would be granted without further delay, but inasmuch as the attorney general assures the members of the board that they will be sued should they undertake to assume control of the river in question, the commission is, without further advice, unable to render favorable judgment in the matter.

It is the intention of the governor to order another hearing at which the board will seek additional facts relative to its regulatory powers in connection with the Klamath River water and, if possible, render a final decision at that time on the utility's applications.

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Two Cities Ask Deschutes River Power Sites

Deschutes River, in Oregon, was named in five recently filed hydro development applications by Portland and one by The Dalles, against which the Oregon State Fish Commission has protested. Ralph C. Clyde, Portland city commissioner-elect, in filing the applications, described the projects on the river, totaling 212,161 theoretical horsepower as: Dam No. 1, 94 ft. high, developing 38,800 hp., to cost $3,149,300; No. 2, 118 ft. high, developing 47,500 hp., to cost $4,136,000; No. 3, 104 ft. high, developing 44,490 hp., to cost $3,916,000; No. 4, 98 ft. high, developing 33,238 hp., to cost $2,915,000; No. 5, 63 ft. high, developing 51,133 hp., to cost $4,499,000. The Dalles asks permission to appropriate 9,000 sec.-ft. for a development of 85,000 hp. Both cities propose construction of publicly owned and operated hydro-electric plants.

In protesting, the fish commission asks for delays until the applicants shall submit definite plans for uninterrupted migration of fish on the Deschutes and Molalla Rivers. The Oregon Light, Power & Irrigation Company, Portland, asks appropriation of 200 sec.-ft. on the latter river for power development purposes.

110-Kv. Submarine Cable to Bring Power to Portland

Announcement that the Northwestern Electric Company will install the highest voltage submarine cable installation in the world and the longest underwater transmission of electric energy at 66 kv. or above, is made by E. F. Pearson, chief engineer. This installation will consist of a 110-kv. submarine cable laid in two sections, one across the Columbia River and one across the Oregon slough between Vancouver, Wash., and the city limits of Portland.

The cable will be used ultimately to bring power to Portland at 110 kv. from the Ariel project on the Lewis River, the first unit of which is to be in operation by Sept. 1, 1931. It is to be installed within the next four months and operated temporarily at 66 kv.

The cable will be of solid type with oil saturated paper insulation, electrostatically shielded, 750,000-circ.mil copper conductor, having a capacity of approximately 83,000 kva. at 110,000 volts. The total length of the two sections will be approximately 5,100 ft.

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Water Power Control Shown To Be a State Function

Control over water power developments is declared to be primarily a responsibility of the individual states in the tenth annual report of the Federal Power Commission, recently made public. "Clearly the government has the principal obligation in safeguarding the interests of navigation and the federal properties as may be affected by water power projects," the report states, "but in other respects the control of these developments is largely a matter of state interest."

The report reveals that the activities of the commission to date have mainly concerned the Western states, California alone accounting for more than a third of the 449 projects licensed so far, while the three Pacific Coast states together have approximately half of the total.

The steam-electric generating plant is shown by the report to be assuming a position of rapidly increasing importance, even in the regions of abundant water-power resources, and to be demonstrating its capacity to compete on even terms with hydro power. Production statistics for 1929 showed for the first time in ten years the failure of hydro power to record a gain in output, while during the same period the energy manufactured by fuel plants increased nearly 10 billion kw.-hr. Despite the current business depression, electric production in 1930 is predicted to equal the 1929 output, but the proportion generated from water power promises to be even less than in 1929.

The Rock Island development of the Puget Sound Power & Light Company, the Ariel project of the Inland Power & Light Company, and the Flathead Lake project of the Montana Power Company are included in the report's list of five projects of major importance now under construction. All are within the Columbia River basin.

The report outlines at some length the policy adopted by the commission for disposing of the many applications in the Colorado River basin. "Applications qualifying for favorable action," it says, "are now in process of authorization, and those which appear out of harmony with the present situation are being held for rejection." The latter includes not only those in physical conflict with Boulder Canyon, but also the developments which are deprived of a possible market for their output for some years in the future on account of the large amount of power to be available from the plant at Hoover dam.

Relative to the growing use of electricity, the per capita demand has more than doubled in the last decade, the report shows.

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L.A. Gas and Electric Denied Rate Rehearing—Petition of the Los Angeles Gas and Electric Corporation for a rehearing on the California Railroad Commission's recent order reducing the company's rates for natural gas service approximately $1,350,000 a year has been denied by the commission. The new rates become effective Jan. 1, 1931.

League Formed to Defend Municipal Power System

With the announced purpose of "keeping the public fully informed as to the facts regarding the municipal power system and supporting competent and efficient officers and employees of the system from attack," a Municipal Light and Power Defense League has been formed in Los Angeles.

Officers of the league are Franklin D. Howell, president; Judge Leslie R. Hewitt, vice-president; Miss Mary J. Workman, second vice-president, and Seward C. Simons, secretary. George H. Dunlop, John D. Elliott, S. C. Graham, James M. Hyde, Francis J. Heney, Harlan G. Palmer, E. M. Schofield, Mrs. Lavina Graham Timmons, and Mrs. Shelley H. Tolhurst compose the executive committee.

"It is our conviction that the city's municipal power system is one of the greatest assets of Los Angeles, saving money to the home owner, the renter, the merchant and the manufacturer and assisting in the establishment and growth of our factories by reason of the cheap rates for electricity that it makes possible," the league's initial pronouncement states. "We shall resist attacks upon the municipal power system on the part of any private or special interest, and shall support and promote its development in the interest of all our citizens."

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Seventy Dine in Smokestack Flue

A SMOKESTACK flue 43 ft. long, 14 ft. wide, and 18 ft. high being built at the Pacific Gas and Electric Company's Station "A" steam plant in San Francisco serves as the banquet hall for these 70 officials and employees of the company. The flue leads from the fire box of one of the new boilers into a smokestack 200 ft. high and 24 ft. in diameter. A second flue, 125 ft. long, will serve two similar boilers at this rebuilt station.

The guests of honor included P. M. Downing, vice-president and general manager; Fred George, engineer in charge of operation; W. G. B. Euler, superintendent of the San Francisco metropolitan district; S. J. Lisberger, chief of the division of electric distribution and steam engineering; M. C. McKay, assistant engineer of construction, who is in charge of enlarging Station "A"; Henry Bostwick, manager of the San Francisco Division; George Barr, General Electric Company, and others.

Edison Company's Rate Reduction Approved

Voluntary reductions in electric rates which will result in a saving of $775,000 a year to consumers on the lines of Southern California Edison Company, Ltd., Los Angeles, proposed by officials of that company at a meeting with members of the California Railroad Commission in San Francisco, have been approved by the commission, and will become effective May 1, 1931. A total of 15,484 agricultural consumers and 18,041 industrial consumers in southern and central California will share in the benefits of the reduction.

This will constitute the company's third major voluntary reduction since 1927 and the eighth of a series of voluntary reductions inaugurated in 1920.

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Power Permits Granted for Alaska Paper Mill Projects

Licenses under the water power act covering important projects in Alaska where large-scale manufacture of newsprint paper is to be undertaken have been granted by the Federal Power Commission to George T. Cameron, publisher of the San Francisco *Chronicle*, and to I. & J. D. Zellerbach, also of San Francisco.

The Cameron application is pursuant to preliminary permits issued June 16, 1927, and June 5, 1930. It is proposed to develop 80,500 hp. on Long, Crater, and Dorothy Lakes near Juneau. The license is to be subject to certain conditions which will be made by the Forest Service and to certain reservations as to items of pre-license costs.

The Zellerbach license is pursuant to a preliminary permit issued June 16, 1927. It covers a 65,500-hp. installation on Mirror Lake and Fish Creek, and on Ella, Manzanita, Grace, Swan, and Orchard Lakes near Ketchikan on Revillagigedo Island. Similar reservations were made in the case of this license.

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Puget Sound Co. 3-Reel Talkie Being Shown

A three-reel sound motion picture entitled "Looking Forward" produced by the Metropolitan Sound Studios, of Hollywood, for the Puget Sound Power & Light Company, is now being shown before civic bodies and service clubs in the Puget Sound district. Routing of the film is being done under the direction of Leslie R. Coffin of Seattle, manager of the Central District.

During the action of the story, views of the various hydro-electric and steam auxiliary plants owned and operated by the Puget Sound company are shown, as are scenes dipicting the uses to which the current generated is put. At a civic banquet scene President A. W. Leonard and Vice-presidents W. H. McGrath and S. P. McFadden discuss policies and future plans of the company.

Public Ownership Secretary Visits West

What the magazine of the Public Ownership League of America characterizes as "the largest, most enthusiastic and successful he ever had" have been a series of meetings in California to which Carl D. Thompson, secretary of that organization, has spoken during the months of October and November, and ending Dec. 5 in Los Angeles. The purpose of the tour has been given as for the formation of a public ownership organization in California and the making of preliminary arrangements for the next national conference of the league to be held in Los Angeles in October, 1931.

Success of the bond election in Fresno for city acquisition of the water works is attributed to Mr. Thompson by the magazine. The secretary also addressed meetings in San Francisco, Tulare, Willows, Lodi, Stockton, Modesto, city auditors, clerks and assessors section of the League of Municipalities at Burlingame, and several cities in southern California. The magazine also records that he "addressed the classes in economics at two great universities."

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Fisherman With a Good Line

G. M. Gadsby, president of the Utah Power & Light Company is telling J. A. Hale, chief engineer, about the big one that got away while he was fishing recently at Fish Lake, Utah

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NEW RULES ISSUED BY CALIFORNIA RAILROAD COMMISSION—Announcement has been made by the California Railroad Commission that recent revisions made in its rules of procedure have been printed and are available for distribution. These rules, which are of particular interest to attorneys and others appearing before the commission, govern the preparation and filing of applications and complaints. Important changes have been made in several of the rules.

Officials at Ruskin Rites

W. G. Murrin (left), president, B. C. Electric Railway Company, Ltd., and Hon. R. Randolph Bruce, lieutenant governor of British Columbia, during the recent ceremonies attending the starting of the generator in the first unit of the company's Ruskin plant. The bridge upon which they are standing connects the power house with a spur-line track

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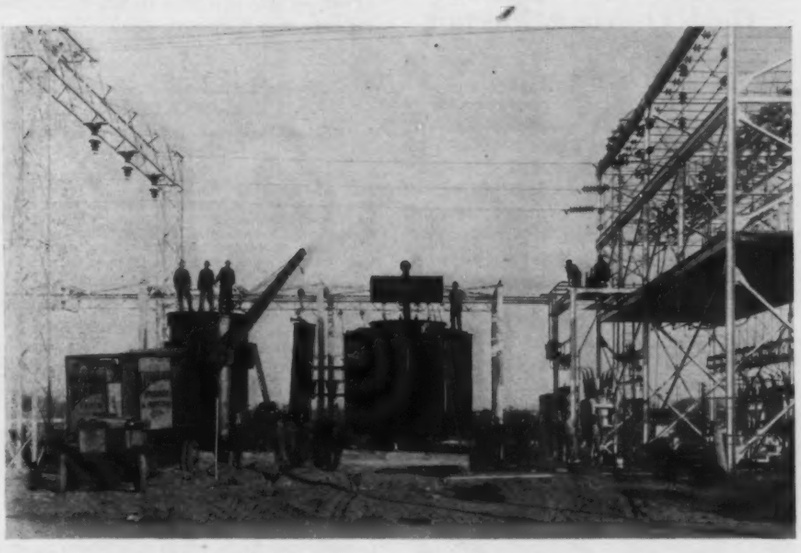
Tuolumne Rights Sought For Groveland Project

Application for permission to appropriate not to exceed 80,000 acre-ft. of water for storage from the Middle and South Forks of the Tuolumne River was filed with the Division of Water Rights of the California Department of Public Works in November by the Turlock & Modesto Irrigation Districts. The action was taken for the purpose of making certain corrections and amendments to applications filed with the Division of Water Resources in 1926.

The water would be used for the district's proposed Groveland power development project. This project contemplates the diversion of the South and Middle Forks of the Tuolumne River to the Groveland reservoir, which would have a capacity of 80,000 acre-ft., with a drop of 1,900 ft. back into the Tuolumne River, developing 57,000 hp. The districts plan to operate this project in connection with the present Don Pedro and La Grange power plants. The estimated cost of this project is $6,000,000.

Application was made by the districts to the Federal Power Commission in 1926 for a preliminary permit to construct the Groveland project, but this permit has not yet been granted. Construction is expected to be started as soon as the permit has been granted.

Giant Transformers Going Into Denver Sub



FORMING part of a bank of three ratio control transformers, these two units are shown in process of installation at the North Denver substation of the Public Service Company of Colorado. One of the transformers may be seen already in place and being equipped with radiators, while the second is being moved into position. The three transformers, with a total capacity of 37,500 kva., are the largest in the Rocky Mountain region and are part of the company's new 100-kv. system centralizing in Valmont steam plant, near Boulder, Colo. The third unit has since been installed.

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Two More Cities Protest P. G. and E. Co. Rates

Stockton and Fresno both have filed complaints with the California Railroad Commission against the Pacific Gas and Electric Company, alleging that the company has in its Modesto district placed in effect rates for general and domestic service that are unduly low as compared with the rest of its system. Both cities ask for equalized rates in all territories of the power company, excepting its Humboldt Division.

Answering, P. G. and E. officials deny discriminatory rates and aver that the lowered Modesto rates were effected upon authority of the commission to meet the competition of the Modesto Irrigation District's electric plant.

Filing of the complaints of the two cities follows action by the City of Oakland. Original complaints were lodged by the Modesto Irrigation District early in November. (ELECTRICAL WEST, Dec. 1, 1930, p. 318.)

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THE CITIZENS LIGHT, POWER & GAS COMPANY, of Ketchikan, Alaska, has applied for a preliminary permit at Lake Perseverance. It is proposed to build a dam at the outlet of the lake and to construct a tunnel extending to Ketchikan Lake, a distance of 6,000 ft. The water is to augment the supply available at the applicant's power house near Ketchikan.

CALIFORNIA OREGON POWER COMPANY has been authorized by the California Railroad Commission to place in effect on Feb. 15, 1931, in the Tule Lake area of Siskiyou and Modoc Counties, rates similar to those in effect on the Oregon side of its territory.

Financial

$5,000,000 in New Capital For Puget Sound Projects

Five million dollars of additional capital, subscribed by its common stockholders, will shortly become available for Pacific Northwest development, A. W. Leonard, president of the Puget Sound Power & Light Company, Seattle, has announced. The common stock of the company is held to the extent of 90 per cent by Engineers Public Service Corporation, which will supply this pro-rata share of the new financing.

At a meeting of the stockholders of the Puget Sound company, held in Boston Dec. 1, it was voted to increase the authorized common shares to 2,000,000 and the authorized preferred shares to 500,000. In addition, directors of the company have offered rights to common stockholders for the purchase of additional new common stock at $25 per share in the ratio of five new shares for each eight held.

The new capital, Mr. Leonard stated, is required in financing the company's $28,000,000 three-year development program, which includes the Rock Island dam project near Wenatchee, and to assure reductions in light rates in 1931 and 1932, which ultimately will bring the maximum primary rate throughout the territory served by its wires to 5½ cents per kw.-hr. The maximum lighting rate will be 6½ cents, Mr. Leonard declared, on March 1, 1931, and will be reduced to 5½ cents during the following year.

In the recapitalization program involving the investment of the $5,000,000 of additional funds, the junior preferred stock of the company will be exchanged for common, share for share.

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Edison Company to Issue $5,000,000 of 4½% Bonds

The Southern California Edison Company, Ltd., has been authorized by the California Railroad Commission to issue and sell on or before Dec. 31, 1931, at not less than 95 per cent of face value, plus accrued interest, $5,000,000 of its refunding mortgage gold bonds, series of 4½'s, due 1955. Of the proceeds it has been authorized to use $4,037,700 to reimburse its treasury for moneys used to redeem the bonds of the Mt. Whitney Power & Electric Company, of the Santa Barbara Electric Company, and of the Edison Electric Company, and to pay $660,700 of bonds of the Santa Barbara Electric Company. The remainder of the proceeds may be used to finance in part the cost of additions and betterments to the Southern California Edison Company's system, under the authorization.

The company intends to sell the bonds through its own organization and, though permission has been asked to sell at not less than 95 per cent of face value, plus accrued interest, it is intended under existing conditions to sell them at not less than 97 per cent of face value and accrued interest. The bonds will be sold for cash and not on an installment payment basis.

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THE CALIFORNIA PUBLIC SERVICE COMPANY, formerly known as the Peoples California Hydro Electric Corporation, which is engaged in the business of supplying electric energy in and about Fort Bragg, Mendocina and Alturas, and other localities in California, and Lakeview, Ore., has been authorized by the California Railroad Commission to issue and sell at not less than par $128,500 of common capital stock, and $158,000 of first mortgage 5½ per cent gold bonds, series of 1941. The company proposes to use the proceeds derived from the sale of these securities to reimburse its treasury for surplus earnings used in making capital additions and also for amounts due and paid to Peoples Light and Power Corporation, and to reimburse its reserve for depreciation.

P.C.E.A.

Transportation Section Meets in Los Angeles

Meeting in the main garage of the Southern California Edison Company, Ltd., in Los Angeles Dec. 4-5, the Transportation Section of the P.C.E.A. proceeded first to an inspection trip through the Alhambra garage of the Edison company.

At the first afternoon's session E. C. Wood, chairman of the section, outlined the work already done and projected for the future by the section, which consisted in study of and recommendations on the various phases of shop, garage, and vehicle operation and maintenance.

Prevention of accidents through the use of physical examinations for drivers was discussed and further study of this problem was recommended. Shop equipment necessary for economical and satisfactory operation caused a long discussion, opinion leaning toward the use of special mechanical devices for wheel aligning, brake testers, etc. Special subjects of study, namely, truck bodies, paints, and fuels were assigned for further study and report.

The Organization Division reported on the value of organization and layout in saving the time of skilled mechanics and suggested that each company look thoroughly into its shop and garage organization with the object of reducing expenses in that part of the company.

A list of standard tools, indespensable for proper maintenance work, is to be furnished to the Maintenance Division by W. H. Bauer. Cost methods and record-keeping were discussed at length, the consensus of opinion favoring unit costs as compared with group costs in truck operation. The work of the cost committee will be devoted to further segregation of costs of operation on a number of popular trucks and motor cars.

Standardization of bodies and chassis dimensions were features that were shown to be very desirable and the vehicle committee was instructed to obtain further data on this subject. Maintenance reduction could be fostered, it was brought out, by the use of protection on running boards and reinforcements to doors as well as more frequent inspections of the running gear.

A study into the feasibility of electric trucks for utility service revealed that, on account of long distance hauling, load fluctuation, and low speeds, these trucks were not practical in this type of service but that they did have a very definite place in the transportation field. Mr. Fairbanks of the Southern California Edison Company gave a talk on the methods used by his company in caring for the company automobiles.

Purchasing-Stores Section Holds Quarterly Meeting

Concurrent with the Engineering Section, the Purchasing and Stores Section of the Pacific Coast Electrical Association held its quarterly meeting at the Los Angeles Biltmore Hotel on Dec. 11-12. The subcommittee on purchasing under C. A. Kelley offered reports on public relations in purchasing, emergency purchase orders, and purchasing department records. G. M. Richardson, chairman of the subcommittee on standardization and simplification of materials covered the advisability of standardization of pole line hardware and the possibility of standard packages of this material.

The Stores Division under W. Maddock suggested improvements in the stores department organization and material testing and control. H. C. Rice, sales manager, Southern California Edison Company, Ltd., addressed the section on the subject: "What the Purchasing and Stores Departments Can Do to Assist in Load Building." Mr. Rice presented new angles in this all-important public utility problem and the ensuing discussion proved of great value to those present. The Stores Accounting Division, under A. A. Charonnat, made a semi-final report on material handling and storekeeping costs. The advantages of mechanical systems of accounting were thoroughly discussed in their relation to storekeeping departments and the consensus of opinion pointed to the fact that these systems did not justify the expensive installation unless a large amount of work was to be done or the equipment could be used advantageously in other departments as well.

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Engineers Have Successful Meeting at Los Angeles

Good attendance and intense interest in the proceedings characterized the quarterly meeting of the Engineering Section of the Pacific Coast Electrical Association, held Dec. 10-12 at the Los Angeles Biltmore Hotel, Los Angeles.

At the general luncheon on Thursday, Dec. 11, R. H. Halpenny, chairman of the section, expressed gratification at the large number of members present for the convention, and earnestly requested the younger engineers to take an active part in the various committee meetings, thereby making the work of the association more valuable to the industry as a whole. Mr. Halpenny commented on the Toronto meeting of the National Electric Light Association. The Engineering Natonal Section, he reported, had suggested that further co-operation would be fostered by an exchange of minutes of meetings held by the sections located in the various parts of the country and expressed the desire of having closer contact with the Pacific Coast organization.

The remainder of the luncheon was devoted to reports of the six delegates to the Toronto meeting, the contexts of which are included in the committee reports which follow.

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Accident Prevention Committee

S. C. DICKINSON

Pacific Gas and Electric Company, Chairman

Members of the accident prevention committee, most of whom were present, met for two days and discussed subjects of vital importance. A great many visitors attended both sessions and entered the discussions, which was very encouraging to the committee. Accident prevention, to succeed, cannot be carried on alone by the "safety" profession; it must have the co-operation of the operating and construction departments.

The committee recommended that member companies make a wide distribution of two N.E.L.A. publications, prepared by the national accident prevention committee. These were entitled, "Safety Methods in Power System Construction," and "Insull Medal Awards."

J. S. Allen, of The Southern Sierras Power Company, made a comprehensive report on discipline and its effect on reducing accidents. The report and ensuing discussions brought out the points that (*a*) disciplinary measures should not be taken against violators of safe practices until rules have been adopted; (*b*) discipline, if properly administered, is the most effective way of impressing upon the employee the benefit of developing the safety habit which, if properly developed, is the principal factor in accident prevention work; (*c*) the human element, through not thinking and acting "safety," is directly responsible for the large majority of accidents, but through the medium of discipline this can be overcome to a large extent, and measures should be taken in all cases even though no injury is received.

In the discussions regarding the responsibility for accident prevention, it was agreed that in a company whose management backs accident prevention work, the man who has the final word in preventing accidents is the foreman. A further means of checking inefficient supervision was suggested in revising accounting methods to permit the cost of an accident to be charged to a particular job.

Other subjects which received attention were rubber gloves, conductivity of treated poles, and the effect of creosote on linemen's belts. The interest of the members and visitors present evinced that accident prevention is receiving serious consideration from all sides and that gradual progress is toward the elimination of this uneconomic and wasteful factor in industry.

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Electrical Apparatus Committee

R. D. LIKELY

San Joaquin Light & Power Corporation, Chairman

The subcommittee on operation and maintenance methods, J. D. Enefer, chairman, presented a preliminary report covering (1) Inspection of Equipment, (2) Organization of Operating and Maintenance Crews, (3) Special Tools, (4) Loading of Transformer and Feeder Apparatus, (5) Protection of Potential Transformers, and (6) Utilization of Salvaged Apparatus.

The first named subdivision, in addition to showing the practice of various companies as to frequency and thoroughness of inspection, brought out a very interesting point concerning circuit breakers on important transmission lines. This was that an effort is being made to obtain as rapid opening as the size and type of breaker will permit, which seems to indicate a field for the high-speed type.

R. B. Kellogg, chairman of the subcommittee on switchgear, led an interesting discussion regarding the possibilities of metal-clad switchgear. One prominent engineer stated his belief that for lower voltages metal-clad switchgear will slowly but surely replace the conventional types, particularly where interrupting capacities are large.

The subcommittee on substation design, C. E. Baugh, chairman, mentioned briefly several papers describing various types of stations built recently, which will be included in the annual report. Much interest was shown in miniature control and metering equipment, the opinion being that in the larger stations a considerable saving is possible while in some cases the operating convenience is of importance, even if the saving is small. Some interest was also shown in hydrogen-filled synchronous condensers, one California company having one

such machine in service and one on order. Papers given included one by B. D. Dexter, describing the Newark 220-kv. substation of the Pacific Gas and Electric Company, one by T. J. Lovell, describing the hydrogen-filled condensers of the Southern California Edison Company, one by R. C. Stackhouse of the Westinghouse company, and one by H. C. Stanley of the General Electric Company, describing miniature switchboards.

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Hydraulic Power Committee

C. M. MARDEL

Pacific Gas and Electric Company, Chairman

Led by Chairman Mardel, the subcommittee reports aroused much interesting and valuable discussion. W. Dreyer reported on the progress of current research and practice in hydro development. This was followed by J. W. Jourdan's report on "Flow Line Conduits" and a report on the mechanical reliability of hydro-electric plants presented by E. F. Maryatt.

In the afternoon session R. M. Peabody reviewed the progress made on automatic and regulating safety devices for hydro plants, and J. M. Gaylord reported on and led the discussion of alloys for hydraulic equipment. In an illustrated lecture E. N. Murphy instructively followed the progress on the construction work of the Pacific Gas and Electric Company's dam on the Mokelumne River. Chairman Mardel reported on the national hydaulic power committee meeting held in Toronto and followed his report with illustrations of the work being done on the immense Beauharnois project near Montreal.

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Inductive Co-ordination Committee

F. B. DOOLITTLE

Southern California Edison Company, Chairman

Three specific cases of inductive co-ordination of unusual interest were presented by members of the subcommittee on this subject. The first involved an 8,400-ft. exposure of Santa Fe Railway dispatching telephone line and Western Union Telegraph circuits to seven 66,000-volt power circuits of the Southern California Edison Company, Ltd. The power circuits were carried on multi-circuit steel towers the center line of which was at a separation of 150 ft. from the center line of the communication circuits. The second described the 110,000-volt transmission line 220 miles long which The Southern Sierras Power Company is soon to construct from its victor substation to the Hoover Dam site on the Colorado River. This line will create an inductive exposure of 188-mile length with the San Bernardino-Las Vegas transcontinental toll lead of The Southern California Telephone Company. The exposure separation is quite irregular and varies from 800 to 30,000 ft. with an inductive separation of less than 10,000 ft. for 123 miles. The third was an example of avoidance of objectionable parallels between telephone exchange plant and local power distribution circuits in Fresno, accomplished by co-operative planning of work.

A paper describing the protective measures employed by the Pacific Gas and Electric Company on its private telephone system was presented by the subcommmittee on power company communication systems. This subcommittee also cited improved results obtained on a specific telephone line by soldering sleeve splices in the line wires. Samples of soldered splices which had been tested and showed no reduction in mechanical strength and considerably lowered electrical resistance were exhibited.

The chairman of the subcommittee on common neutral reported on the present status of this investigation. He also read the proposed rules governing construction and maintenance of common neutral distribution systems. There was considerable discussion of some of the requirements of these rules.

The subcommittee on radio co-ordination presented a report on the answers by eight companies to a questionnaire covering general practices and policies in the matter of dealing with radio interference and complaints. A paper describing the effect of voltage fluctuation on the life of a.c. tubes and radio set operation was read and discussed. The subject of radio installation and the use of filters was covered in a paper by the radio engineer of a company which has had considerable experience along this line, it being this company's policy to make corrections to consumers' radio installations at a reasonable charge for the service where such measures will avoid radio interference, the cause of which it is not economical to correct. Much interest in this subject was evidenced by the discussion.

G. R. Walters, interference department, Radio and Music Trades Association of Southern California, presented a paper on "Radio Interference From Household Appliances," incidentally commending the P.C.E.A. for the action it had taken in this matter through a resolution originating with the appliance committee of the Commercial Section.

C. A. Gustafson, General Electric Company, read a brief description of the radio noise meter recently developed by his company. This device is equipped with a calibrating set which makes possible the measurement of radio field intensity in microvolts per meter.

F. W. Thomas, Tobe Deutschman Corporation, presented an interesting moving picture film illustrating the uses of the Tobe line of "Filteretten" in the suppression of radio interference.

Northwest Engineers on Inspection Trip

H. H. Schoolfield, chief engineer, B. P. Bailey, assistant to the general manager, Pacific Power & Light Company, and E. F. Pearson, chief engineer, Northwestern Electric Company, all of Portland, pause at the Rattlesnake Creek camp of the Phoenix Utility Company while on an inspection trip to the 110-kv. transmission line being built by that company between Yakima and White Salmon, Wash. The line will connect the Condit plant of the Northwestern Electric Company on White Salmon River with the eastern Washington power system of Pacific Power & Light

Meter Committee

W. A. McMEEKIN

Los Angeles Gas and Electric Corporation, Chairman

Educational courses for metermen are being well supported. The University of Arizona course was held last November with an attendance of 21 men. Plans are well under way for holding the University of California and the California Institute of Technology courses this spring. Two of the member companies reported 38 men taking the new N.E.L.A. courses.

The operation and maintenance practice of several companies on various types of relays was discussed at length. Recent improvements of relays were described.

Operating problems of the meter departments received special attention. Selection of men, handling of complaint tests, checking of field standards, transportation and testing practice in connection with current and potential transformers, were suggested as topics for investigation. One company reported extensive overload tests made on various types of meters. They favor changes in wiring codes permitting meters to be placed ahead of fuses, as extreme overloads, even to point of destruction of meters, have created no fire hazard. Theft of current could be materially reduced if this method were adopted.

A new type of combination switch and bypass equipment for making over-all tests on large loads was demonstrated. This equipment was accepted as an alternative scheme for those companies making these tests.

Other subjects considered were reactive kva. metering, indicating and recording meters with reference to remote measurements, special tests and investigations, meter obsolescence, and new developments. Certain operating companies on the Pacific Coast have traced the failure of cables "due to unknown causes" to the movement of lead-covered cables. This movement results in breakage of the cable sheath with the ultimate electrical breakdown of the cable. During the past year a number of interesting and valuable experiments have been made to devise means of overcoming this trouble, and the members reporting on this subject felt that the problem had been solved in a satisfactory manner.

Through the courtesies of two of the manufacturers of high-voltage cable, an illustrated talk on the manufacture of high-voltage, oil-filled cable was presented by one manufacturer, while another manufacturer submitted a paper, illustrated by motion pictures, covering the solid type of high-voltage cable, together with a very interesting series of reels showing the laying of two sets of 66-kv. single conductor cable across the Mississippi River at St. Louis.

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Overhead Systems Committee

J. O. TOBEY

Pacific Gas and Electric Company, Chairman

Chairman Tobey opened the committee meeting with a short report on the national committee meeting in Toronto, the minutes of which were distributed and referred to during the remainder of the day as the occasion warranted. A gratifying attendance of approximately 125 members and guests indicated the widespread interest in the proceedings of the committee.

Semi-final reports from the various subcommittee chairmen were made and discussed. J. B. Madden thoroughly covered the proper loading of distribution transformers in his report. This was followed by the report of K. B. Ayres on the apparent excessive safety factors for poles guyed as required by General Order No. 64-A. A very interesting motion picture, showing how impact to a pole will affect transformers hung thereon, caused widespread comment.

In his report R. C. Cowles stressed the importance of grounding to the industry by bringing out many details pertinent to the subject. W. E. Row ably covered the subject of bare vs. covered wire, and presented valuable information on the expanding use of tree wire. C. B. Judson, chairman of the protective devices subcommittee, devoted his time to the ever-present problem of fuse standardization.

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Prime Movers Committee

C. H. DELANY

Pacific Gas and Electric Company, Chairman

Many matters relating to steam power plant design and operation were discussed by this committee. Changes that have been made in power plants for the purpose of improving operating results were discussed from various engineering and economic angles.

Numerous advantages of using the heat balance method of testing boilers were pointed out, tests having been made at one plant to compare this method with the ordinary evaporative test. Comparisons showed that the heat balance method is sufficiently accurate for ordinary purposes when proper allowance is made for the loss due to radiation.

Steam piping was discussed quite fully, descriptions being given of methods of testing bolts and of inspection of piping to determine weaknesses.

The subject of water conditioning, one of the most important steps in the operation of steam plants, was discussed and a progress report was made by the subcommittee. The fact was brought out that one of the most important points in connection with the proper treatment of feed water is the effect it has on carry-over from the boiler. This results in deposits on the turbine blades which affect the capacity and efficiency of the turbines. It was pointed out that the loading of boilers is quite different in different plants, and as this has a great effect on the amount of carry-over, it is difficult properly to compare results.

The chairman of the subcommittee on plant management brought out some interesting points in connection with the effect of social activities on the morale of men in the plants.

Further discussion of the best method of working up subcommittee final reports for publication led to definite recommendations which should greatly increase their value.

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Underground Systems Committee

E. R. STAUFFACHER

Southern California Edison Company, Chairman

The first matter taken up was that of a report by the chairman covering certain features of the committee reports submitted at the Montreal meeting in October on conduit and manhole construction, oil reservoirs and accessories for underground cable, a.c. network construction and operation, cable sheath damage and protection, and safe practices in cable identification.

The subject of duct material and pulling stress of cables through various types of ducts was presented. Certain tests made to determine the pulling stress required to start moving cables after the conduit had been subjected to various temperatures were reported upon. Discussion at some length followed presentation of the subject of progress in the economic application and use of the a.c. network system. Certain studies made on the Long Beach system of the Southern California Edison Company, Ltd., were illustrated in detail. This report outlined the methods of arriving at conclusions which indicated that the use of an a.c. network system under the particular conditions studied was the most economical method of expanding the distribution system.

The subject of leaded vs. non-leaded cables was taken up from the standpoint of suitability and justification of the two forms. The growing demand for a less expensive form of underground construction in territories which do not justify the standard and more expensive forms has resulted in considerable study being made on the possibilities of adapting the non-leaded type of cable to underground distribution. A number of recent installations of the non-leaded type of cable on the Pacific Coast were reported upon and discussed. A paper entitled "Movement of Lead-Covered Cables Due to Load Heating" attracted considerable interest.

Meetings

Agricultural Engineers to Meet in San Francisco

A joint meeting of the Land Reclamation Division and the Pacific Coast Section, American Society of Agricultural Engineers, will be held at the Whitcomb Hotel, San Francisco, Jan. 6-7. The Pacific Coast Section of the society embraces Washington, Oregon, California, Arizona, Nevada, Utah, Idaho, British Columbia, Alberta, Alaska, and Mexico. The Land Reclamation Division is a technical division of the society.

Of much interest to many men in the electrical industry will be an address on "The Influence of the Boulder Canyon Project on Future Development" to be given by Miss M. A. Schnurr, assistant to the Commissioner of Reclamation, at 2 o'clock on Wednesday, Jan. 7.

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Coming Events

International Association of Electrical Inspectors, Northwest Section—Sixth annual convention at Salem, Ore., Oct. 5-7, 1931.

National Electric Light Association—Fifty-fourth convention and exhibition, Atlantic City Auditorium and Convention Hall, Atlantic City, N. J., June 8-12, 1931.

National Electrical Wholesalers Association—Pacific Division—Convention at Hotel Del Monte, Del Monte, Calif., Jan. 29-31, 1931.

Northwest Electric Light and Power Association—Engineering Section meeting at Wenatchee, Wash., March 18-20, 1931.

Pacific Coast Electrical Association—Annual convention at Hotel Del Monte, Del Monte, Calif., June 24-26, 1931.

Commercial Section meeting, Los Angeles, Feb. 5-6, 1931.

Western Metal Congress and Western Metal and Machinery Exposition—Civic Auditorium, San Francisco, Feb. 16-21, 1931.

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Plans Under Way for Metal Congress and Exposition

Plans are beginning to take shape for the National Western Metal Congress and the National Western Metal and Machinery Exposition to be held in the Civic Auditorium, San Francisco, Feb. 16-21. Arrangements already have been made by the American Institute of Electrical Engineers and the Pacific Coast Electrical Association to have a joint session at the convention. A. W. Copley, Westinghouse Electric & Manufacturing Company, San Francisco, representing the A.I.E.E., and R. H. Halpenny, The Southern Sierras Power Company, Riverside, chairman of the Engineering Section, P.C.E.A. will be in charge of the program for that session. One of the important subjects to be discussed will be electric furnaces and electrical industrial heating.

Electrical subjects will also figure prominently in programs of the American Welding Society, American Society for Testing Materials, and the Society of Automotive Engineers. Displays of heat-treating by electricity, as well as the use of electricity in factories, will occupy a large area in the metal and machinery exposition, which will accompany the congress.

Arrangements for the congress and exposition are in the hands of W. H. Eisenman, of Cleveland, secretary of the American Society for Steel Treating. He has opened headquarters in the Civic Auditorium building.

C. A. Wolfrom Heads Utah Electrical League

Carl A. Wolfrom, manager of the Salt Lake division of the Utah Power & Light Company, was elected president of the Electrical League of Utah at the annual election of members of the board of trustees and officers for the ensuing year, held Dec. 8. He succeeds G. W. Forsberg, of the Wasatch Electric Company.

W. J. Berryman, sales manager of the Mine & Smelter Supply Company, was elected vice-president, and F. S. Cundiff, commercial manager of the Mountain States Telephone & Telegraph Company, was named secretary-treasurer. R. E. Folland was retained as executive secretary.

Members of the board of trustees were elected as follows:

Jobbers—J. M. Perlewitz, Graybar Electric Company; J. A. Kahn, General Electric Supply Company; W. J. Berryman, Mine & Smelter Supply Company; and C. B. Hawley, Inter-Mountain Electric Company.

Contractor-Dealers—J. C. Jacobs, Apex Electric Company; G. J. Guiver, E. G. Holding Electric Company; R. R. Reid, Reid Electric Company; and G. W. Forsberg, Wasatch Electric Company.

Manufacturers—W. A. La Pierre, American Steel & Wire Company; W. A. Moser, Westinghouse Electric & Manufacturing Company; Leo Brandenberger, manufacturer's agent; and Ray Ackerman, manufacturer's agent.

Central Station—P. M. Parry, R. M. Bleak, M. L. Cummings, Jr., and C. A. Wolfrom, all of the Utah Power & Light Company.

Telephone—F. B. Cundiff, Mountain States Telephone & Telegraph Company.

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ELECTRICAL BUREAU REORGANIZATION DINNER—Announcement of the reorganization plan of the California Electrical Bureau, discussion of the 1931 promotional program of the electrical industry, and presentation of the 1931 sales plan of the Pacific Gas and Electric Company will be the highlights of the dinner meeting Jan. 6 to be held under the auspices of the Pacific Coast Electrical Bureau at the Commercial Club in San Francisco. Everyone in the electrical industry is invited to attend. Reservations should be made with K. I. Dazey, managing director, Pacific Coast Electrical Bureau, 447 Sutter St., San Francisco.

INTERESTING ANNOUNCEMENTS AT JOBBERS' OPEN MEETING—Power company executives will outline plans, programs, and budgets for 1931 at the open meeting to be held Saturday, Jan. 31, during the convention of the Pacific Division of the National Electrical Wholesalers Association at Del Monte, Calif. Features of particular interest to commercial men promise to make this meeting, in charge of R. E. Fisher, Pacific Gas and Electric Company, one of unusual appeal.

Personals

Ray W. Turnbull Advanced By Hotpoint Company

ANNOUNCEMENT was made on Dec. 5 by George A. Hughes, president, Edison General Electric Appliance Company, Chicago, that at a meeting of the board of directors of the company held the previous day, Ray W. Turnbull, Pacific Coast district sales manager, had been elected vice-president of the company. He is to have charge of the sales and advertising activities of the company and will maiintain headquarters in Chicago after Jan. 1, 1931.

Mr. Turnbull's twenty-year association with the Edison General Electric Appliance Company and its predecessors on the Pacific Coast have endeared him to a wide circle of friends in the electrical industry in all its branches in this region. Leaving the Southern California Edison Company in 1910 to join the Pacific Electric Heating Company, of Ontario, Calif., original makers of Hotpoint products, his rise was rapid and continuous. In 1911 he entered the employ of the General Electric Company as Pacific Coast heating device specialist, continuing in that capacity until 1917 when he was granted a leave of absence to enter the Army Air Service. Before the war was over he earned his commission as an airplane pilot.

In the meantime, the Heating Device Section of the General Electric Company had on Jan. 1, 1918, been merged with the Hotpoint Electric Heating Company and the Hughes Electric Heating Company to form the Edison Electric Appliance Company. Mr. Turnbull returned to the new company in 1919 and was given charge of Pacific Northwest sales, and for several years he made himself an indispensable factor in the pioneering of the electric range business in that territory. In 1924 he was promoted to be assistant Pacific Coast sales manager with headquarters in San Francisco, and in January of 1926 was made Pacific Coast district manager, a position he has held until the present time.

Mr. Turnbull will be succeeded as Pacific Coast district manager in San Francisco by Ralph J. Cordiner, who, since 1924, has been Northwest representative for the company in Seattle. Mr. Cordiner's association with the company in the Northwest dates from 1922.

J. C. Platt, since March first of this year factory representative of the company in Portland, will take Mr. Cordiner's place in Seattle as Northwest representative. Prior to coming to Portland, Mr. Platt represented the company for nine years in the Salt Lake territory.

CARL A. WOLFROM

JOHN COLLINS, JR.

RAY W. TURNBULL

In Charge of Standard Management Projects

JOHN COLLINS, JR., for the past several years vice-president and chief engineer of the United States Engineering Corporation, New York, has recently been appointed chief engineer for Standard Management and Operating Corporation, San Francisco. Mr. Collins will be in charge of all construction and engineering enterprises performed by the management company for Pacific Public Service Co., its subsidiaries, and for all clients of the company. He also will act in an advisory capacity regarding operations of properties controlled by Pacific Public Service Co.

A major expansion project involving the electric transmission and distribution systems of Coast Counties Gas and Electric Company, a subsidiary of Pacific Public Service Company, is now being designed and will be executed under the direction of Mr. Collins. In addition, he will supervise the design and construction of butane gas distribution systems included in a pioneering program recently launched on the West Coast by Pacific Public Service Company.

Before he became vice-president and chief engineer of the United States Engineering Corporation, Mr. Collins held similar positions with other large public utility enterprises in the East, including the National Public Service Company for whom he superintended the construction of extensive transmission and substation projects, as well as several large steam and hydro-generating stations.

Other organizations with which he has been associated include the Brooklyn Edison Company, American Sugar Refining Company, Public Service Production Company of New Jersey, and the General Engineering and Management Corporation. Mr. Collins was also assistant chief engineer of the J. G. White Management Corporation, owners and operators of large public utility properties throughout the United States and in foreign countries.

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L. A. VOSMER, treasurer of the Denver Electrical Contractor's Association, left recently to review a wiring job in Arizona.

League President Well Known to Industry in Utah

CARL A. WOLFROM, newly elected president of the Electrical League of Utah, first became associated with the power and light industry in 1902, when he came West from Ohio and entered the employ of the Telluride Power Company. From 1903 to 1905 he was operator and plant superintendent of the Provo and Olmsted plants, which were at that time owned and operated by the Telluride company. During the three years of 1906, 1907 and 1908 Mr. Wolfrom attended the University of Michigan, pursuing a course in mechanical engineering. In the latter part of 1908 he again came West and was engaged in reconnaissance survey work on various streams in California for the late L. L. Nunn.

From 1909 to 1913 he was superintendent of the Grace plant of the Telluride company. When the Utah Power & Light Company was organized and a consolidation of a number of companies and properties took place early in 1913, he was placed in charge of the power company's Wheelon plant on Bear River, and also of its distribution system in its Garland and Tremonton territory.

In 1914 he became assistant to the operating manager, with headquarters at the general offices in Salt Lake City. He filled this position until the early part of 1918, when he was appointed manager of the Idaho Falls division. In July, 1924, he was promoted to the position of manager of the Provo division, and in September, 1927, was advanced to the position which he now holds, that of manager of the power company's Salt Lake division.

Mr. Wolfrom has been prominently identified with many of the Electrical League's activities and also with civic enterprises.

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G. C. MILLER, of the Jervis Electric Company, was recently honored by being the only candidate for civic honors in Vancouver, B. C., to be elected by acclamation. He was first elected to the council in 1928, serving as chairman of the airport, civic, harbor, and utilities committees. He has now been re-elected for a further two-year term.

Edward Hyatt Heads State Engineers Assn.

EDWARD HYATT, state engineer of California, and chief of the Division of Water Resources of the State Department of Public Works, with headquarters in Sacramento, Calif., was elected president of the Western State Engineers Association at its annual meeting held recently in Denver.

Mr. Hyatt has been state engineer and chief of the Division of Water Resources since 1927. In that capacity he has had charge of water matters under the direction of the state government, including the following principal items: Investigation of water resources of the state and development of plan for maximum conservation; supervision of dams in the interest of safety; supervision of irrigation districts (94 active districts, irrigating 1,755,600 acres of land, bonded indebtedness $97,091,882); administration of water and water rights; flood control and reclamation. For three years prior to his appointment as state engineer, he was chief of the Division of Water Rights in California.

Following his graduation from Stanford University with an A.B. degree in civil engineering in 1912, Mr. Hyatt joined the engineering department of the San Joaquin Light & Power Corporation, Fresno. In 1914 he became an engineer with the California Highway Commission, remaining in that position until 1916, when he joined the California Water Commission and the Division of Water Rights, of which he was appointed chief in 1924. He is secretary of the Hoover-Young Commission on California Water Resources and a member and secretary of the California Irrigation and Reclamation Financing and Refinancing Commission.

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HARLEY P. WILSON, of Washington, D. C., a member of the board of directors of the Western Power Corporation and the North American Company, of New York, is spending the winter on the Pacific Cooast for the purpose of regaining his health. As president of the Western Power Corporation, Mr. Wilson, in 1924, engineered the purchase by that corporation of a controlling interest in the San Joaquin Light & Power Corporation, and in the following year brought about the sale of the Western Power Corporation to the North American Company.

DR. GEORGE OTIS SMITH, director of the U. S. Geological Survey since 1907, has been chosen by President Hoover to be chairman of the new Federal Power Commission. Frank McNinch, of North Carolina, former mayor of Charlotte, was nominated for the remaining place on the committee. The three other members were nominated prior to the close of the last session of Congress. They were: Frank B. Williamson, of Washington; Colonel Marcel Garsaud, of Louisiana; and Claude L. Draper, of Wyoming.

DR. H. D. ARNOLD, director of research in the Bell Telephone Laboratories, New York, has arranged his itinerary on a projected Western trip to present talks before the A.I.E.E. Sections in San Francisco, Spokane, Seattle, Portland, and Los Angeles. Tentative dates which have been set are: Spokane, Jan. 12; Seattle, Jan. 15 or 16; Portland, Jan. 19; San Francisco, Jan. 23; and Los Angeles, Jan. 26, 27, or 28. The San Francisco talk will be made in the main auditorium of the Pacific Gas and Electric Company, 245 Market St., at 7:30 p.m. The noted scientist was one of the original group which solved the problems relative to the establishment of telephone communications between New York and San Francisco in 1914. His contribution to this development included a repeater element, in the form of a high-vacuum thermionic tube.

CLAXTON E. ALLEN, formerly manager of the Southwestern District of the Westinghouse Electric & Manufacturing Company, was elected a commercial vice-president of that company at a recent meeting of its board of directors. Mr. Allen has been associated with the Westinghouse company since 1909, his first position being as head of the transformer division of the detail and supply department. Three years later he was appointed assistant to the manager of that department. For a short time in 1915 he was attached to the sales department of the New York district office, and then was made manager of the supply division and central station division of the Chicago office, which position he held until 1922 when he was appointed manager of the St. Louis district office.

C. E. CUNNINGHAM, son of R. E. Cunningham of Farnham & Cunningham, Los Angeles, has joined that firm as electrical and sales engineer. Mr. Cunningnham graduated from Stanford University in 1929, after which he spent a year with The Wagner Electric Corporation, six months at the factory in St. Louis and six months at the sales offices of the corporation in Los Angeles. Among the manufacturers represented by Farnham & Cunningham are Schweitzer & Conrad, Inc., G. & W. Electrical Specialty Company, and The Wagner Electric Corporation.

J. D. CONE, manager, Cameron department, Ingersoll-Rand Company, of New York, spent three weeks in San Francisco and Los Angeles during December at the offices in those cities of the Ingersoll-Rand Company of California. Mr. Cone expressed himself as much pleased with conditions on the Pacific Coast.

JOHN ALLEN CLAY was the guest of honor at a banquet tendered him at Durango, Colo., by the Western Colorado Power Company on Dec. 1. The occasion marked the twenty-fifth anniversary of his employment as general manager of the company.

D. W. PONTIUS, president of the Pacific Electric Railway, Los Angeles, has been appointed controller of the Metropolitan Water District of Southern California by unanimous vote of the board of directors of the district. The district, composed of a number of communities in southern California, was formed to construct the great Colorado River aqueduct to bring a domestic water supply to the member cities. Mr. Pontius has stated that he would be ready to serve until construction of the aqueduct was well under way, when, in his opinion, the district should have a salaried controller who would give all of his time to the duties of the office. Mr. Pontius is serving without salary.

A. E. STRONG, since 1928 general superintendent of the Coast Counties Gas & Electric Company, Santa Cruz, Calif., will be temporarily affiliated with Natural Gas Properties, Inc., under the direction of the Standard Management and Operating Corporation, of San Francisco, as general manager of the Washington and Oregon division. His headquarters will be in Portland, and he will superintend the construction of butane plants throughout the Northwest.

SAMUAL H. WORSWICK, Pacific Coast representative of the Taylor Instrument Companies, Rochester, N. Y., for the past sixteen years, with headquarters in San Francisco, has resigned, effective Jan. 1. His successor is G. H. Linsley, Jr., who has been associated with the Taylor companies in San Francisco for the past few years. Mr. Worswick expects to spend his time in sales lecture work and in promoting the sale of his recently published manual, "Romance of Selling."

THOMAS A. FAWELL, formerly associated with the Hoffman Specialty Company in San Francisco, has joined The Marwood Company of San Francisco, Inc., distributor and jobber of industrial motors and electrical specialties.

Obituary

ANDREW MURRAY HUNT, electrical, mechanical and chemical engineer, died in Berkeley, Calif., Dec. 8 at the age of 71 years. Since the sale in 1913 of the firm of Hunt, Mirk & Company, San Francisco, which he founded, Mr. Hunt had acted in an advisory capacity both on the Pacific Coast and in New York.

C. E. HICKMAN, Seattle, formerly general manager of The Pacific Telephone and Telegraph Company, died in Seattle recently from injuries sustained in an automobile accident. Mr. Hickman had retired a short time ago from the telephone company.

GEORGE L. ARNOLD, since 1923 purchasing agent for the El Paso Electric Company, El Paso, Texas, died Dec. 16 at the age of 40, following a brief illness.

Contractor Dealer Inspector

Northwest Inspectors Appoint Committees

October 5 to 7, 1931, were the dates set for the sixth annual convention of the Northwest Section, International Association of Electrical Inspectors, by a meeting of the executive committee of that body held recently. Salem, Ore., was the place chosen at the last convention for the 1931 meeting.

At the same meeting of the executive committee the appointment of standing, special and general committees to function during the present year was completed.

The standing committees with their chairmen are as follows: Clearing house committee, L. W. Going, chief electrical inspector, Portland; membership committee, H. A. Patton, electrical inspector, Washington Surveying and Rating Bureau, Seattle; meetings and papers committee, E. B. Morrison, assistant electrical engineer, Oregon Insurance Rating Bureau, Portland; electrical fires and accident committee, W. A. Groce, assistant state fire marshall, Olympia.

Special committees carried over and continued from last year are a committee on inspection forms and procedure with A. M. McLean, deputy electrical inspector, Portland, as chairman; committee on metal wireways, W. E. Roberts, deputy electrical inspector, Portland, chairman; and uniform ordinance committee, F. C. Lyman, deputy electrical inspector, Portland, chairman. The legislative committees for the states of Oregon and Washington have this year been combined into one committee with F. H. Murphy, Portland General Electric Company, Portland, as chairman.

Two new special committees were provided for at the last convention held in Bellingham, Wash., in August. These are a committee to formulate regulations about temporary wiring at fairs and carnivals, of which H. S. Jenkins, city electrician, Bellingham, Wash., has been appointed chairman, and a committee to investigate the desirability of using no wires smaller than No. 12 B and S gage, which is to be chairmaned by W. R. Grasle, E. L. Knight Company, Portland.

In addition to the committees named above, there have been appointed seventeen general committees each covering one of the articles of the code. E. G. S. Pryor, resident engineer, Underwriters' Laboratories, Seattle, has been named to head the committee of associate editors of the *News Bulletin* of the I.A.E.I.

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THE NEW COTTAGE HOSPITAL at Santa Barbara was recently wired by the Nielsen-Smith Electric Company of that city. It includes elaborate call systems and paging systems for nurses.

COL. FREDERICK A. LIND, past president of the Commercial Law League of America, has been appointed assistant secretary of the Electrical Credit Association, it was recently announced. Colonel Lind will have charge of the field work and functions of this organization, duties in keeping with his training as an organizer and executive. His appointment is held to be highly significant in the face of the general movement for controlled credit in the wholesale and contractor-dealer branches of the electrical industry.

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W. C. SMITH, contractor of Portland, Ore., was recently awarded the contract for the construction of the Portland-Pasco section of the Portland-Spokane airway lighting system. The job involves the installation of 17 rotating beacons, four code flashing beacons and the establishment of eight emergency landing fields.

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BEN JOHNSON, proprietor of the Tamalpais Electric Company at Kentfield, Calif., has recently built a seven-room addition to his store and office building for a Red Seal apartment for his own family. This is completely equipped with range, refrigerator, water heater and air heaters. According to Mr. Johnson, there are convenience outlets everywhere he could think of putting them.

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SAM FINGERHUT, Electragist of Bakersfield, Calif., has just recently completed electrical work for the new Pacific Telephone and Telegraph Company Building in that city.

Arizona Dealer Plan Tried

By an agreement entered into between the Arizona Electric League and the Central Arizona Light & Power Company, electrical dealers in Glendale, Ariz., will have the privilege of selling equipment and accessories from the salesroom of the utility company.

This is an experiment in the interest of amity and good business. The dealer making such sale will be paid in cash, the company making collections from the customer and extending the usual terms.

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THE SOLANO SUPPLY & CONSTRUCTION COMPANY, of Fairfield, Calif., recently moved to a new and attractive store one block away from its former location. It has a refrigerator and merchandising display, modernistic lighting fixtures, and the building itself is of attractive Spanish architecture. T. O. Dowdell is manager of the company.

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MODERNISTIC lighting effects characterize the new Bank of America Building at Bakersfield, Calif., which was wired by Tom Drury, Electragist of that city.

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THE WILLE ELECTRIC COMPANY, of Modesto, not long ago completely remodeled its store, extending its display space and placing the shop, formerly at the rear of the establishment, in the basement. The shop includes a motor rewind department.

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THE AZUSA ELECTRIC COMPANY, 725 Azusa Ave., Azusa, Calif., has been reopened by E. C. Pierce.

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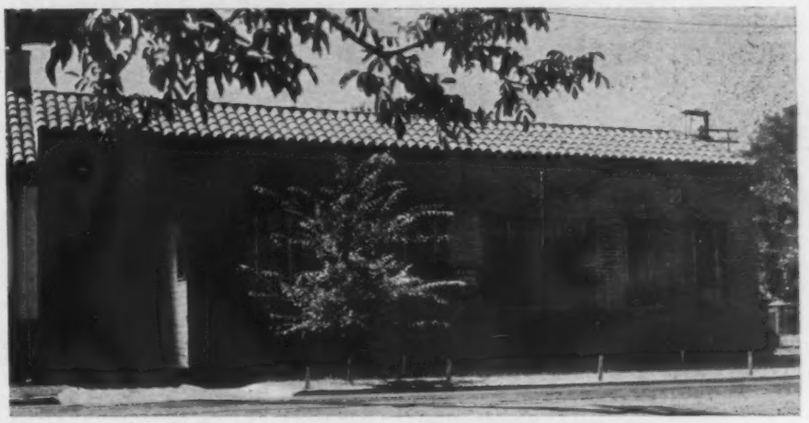
Sacramento Electragist in His Own Building



AFTER conducting his electrical contracting business for several years from an office downtown in the Ochsner Building, George C. Foss, not long ago had erected for him a one story brick building outside the downtown district, at 1720 Eighth St., Sacramento, Calif. He has found the change beneficial in that shop and storage facilities are combined with his office, parking space is available for customers, and he is located near other building materials and service suppliers. Mr. Foss does no merchandising and so finds the location ideal for a strictly high-grade contracting business. His own office is decorated with hunting trophies.

R. N. DICER, well-known electrical contractor of Vancouver, B. C., has returned to that city after a prolonged absence in the United States and announces the opening of a new place of business at 1762 West Sixth Ave., under the name of R. N. Dicer & Company. K. D. Raker, formerly in the electrical business in Oregon, is associated with Mr. Dicer.

CALIFORNIA ELECTRICAL CONSTRUCTION COMPANY "week" was a novel feature put on at the Club Sandwich Shop in San Francisco recently. On display in the cafe through co-operation with Clyde L. Chamblin, of the electrical company, were the smallest and the largest Mazda lamps, posters and appliances advertising the electrical idea. The plan can be used by many other contractors as a good method of advertising in co-operation with their own local merchants and cafe owners.

THE UNITED ELECTRICAL SUPPLY COMPANY has opened a Majestic radio and refrigerator service and display room at 46 West Fourth South St., Salt Lake City.

AN ELECTRICALLY-COOLED swimming pool is a sign of the electrical-mindedness of J. J. Mitchell, Jr., resident of the Santa Ynez Valley and purchaser of power from the Midland Counties Public Service Corporation. There are two electric refrigerators in the 44-kw. installation at Mitchell's ranch home. One of these is tied in with the swimming pool and showers, providing ice cold water for the latter and cakes of ice for the former.

Trade School Class Wires Red Seal Home

THIS five-room home of E. L. Koethen, of Ramona Drive, Riverside, Calif., was wired completely by the vocational electric class of the Riverside Polytechnic High School under the direction of R. H. Ingersoll. Wiring for an electric range was installed and the house was awarded a Red Seal certificate. The house itself

was built by the carpentry class of the school. Upon completion it was sold to its present owner.

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STONE-RYALS ELECTRIC COMPANY installed the lighting in Bernstein's new fish grotto on Powell St., San Francisco. Besides an ample inside lighting job, an outside crow's nest was formed of neon tubing over the prow of the ship which forms the front of the grotto.

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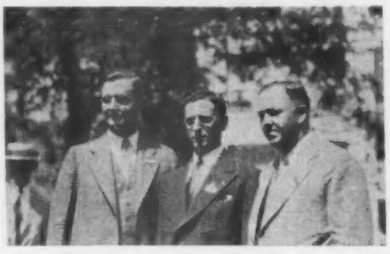

Electragistically motivating are these three gentlemen: Larry Davis, general manager, L. S. Mayer, president, and E. N. Peek, vice-president of the A.E.I.

EARL E. BROWNE, formerly manager of the San Francisco Contractors and Dealers Association, and executive secretary of the Northern Chapter, California Electragists, has again become associated with Charles A. Langlais, electrical contractor and dealer, 472 Tehama St., San Francisco, with whom from 1919 to 1925 he was in partnership. Mr. Browne sold out his partnership to Mr. Langlais at that time to become manager of the San Francisco association. With the reorganization of the association to become the San Francisco Electragists and the abandonment of the position of manager, Mr. Browne after a vacation became reassociated with his former partner. The firm name will continue as Charles A. Langlais Company. Mr. Browne is the firm's representative in the San Francisco Electragists.

RYAN & SON LIMITED, electrical contractors with registered offices at Standard Bank Building, 510 West Hastings St., Vancouver, B. C., was recently incorporated at Victoria, B. C., under the Provincial Companies Act. Papers show the company to be capitalized at $10,000, and describe it as "electrical contractors, wholesale and retail dealers in electrical goods."

A NOVEL MEANS of attracting trade to the store is one that was happened onto by accident by the Electric Shop at Tracy, Calif., of which E. S. Abbott is the proprietor. As a favor to an acquaintance the lady taking care of the merchandise store during the day brought in a small circulating library. It has been found to bring people into the store, stimulate the sale of small items, and to give a dressy appearance to the establishment. A new shop with several distinctive features is being planned by Mr. Abbott for the near future. One of the features, no doubt, will be an extension of the circulating library.

THE CODE AND WIRING committee of the Electrical League of Colorado met recently to give consideration to suggested uniform range wiring standards for Colorado, Wyoming, and New Mexico. No definite decisions were reached.

O. A. CARLSON ELECTRIC COMPANY, electrical contractor of Seattle, has moved from 2020 Second Ave. to larger quarters at 2212 Second Ave.

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Mere 28 Years in One Location

AFTER 26 years in its original location in Pasadena, Calif., the H. L. Miller Company, Inc., enterprising electrical dealer of which Frank T. Hoover is president, has moved to new quarters at 233 East Colorado St. The modern store interior provides conveniences for easy shopping and embodies an accessible stock arrangement.

Manufacturer Distributor

Maydwell & Hartzell, Inc. Open Seattle Office

Coast-wide distribution of their products is made available to the manufacturers represented in this territory by Maydwell & Hartzell, Inc., with the opening by them on Jan. 1 of a branch office and warehouse at 1015 Republican St., Seattle.

H. H. ("Hank") Manny, who has been identified with the sale of pole line transmission and distribution equipment in the Northwest for the past fifteen years, has been placed in charge of Northwest activities of Maydwell & Hartzell through their Seattle office.

Establishment of a Northwest office marks the second major expansion of this firm since the opening of their first office in San Francisco in 1923. Their entry into the Los Angeles area followed in the following year, with the establishment of an office in that city.

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PIANO COMPANY TO MANUFACTURE REFRIGERATORS—Entrance of the Starr Piano Company of Richmond, Ind., into the electric refrigerator manufacturing field in southern California, through purchase of the controlling interest in Benedict & Company, Inc., Los Angeles, has been announced by Barry Benedict, general manager of the latter concern. He also announced plans for a new plant requiring the expenditure of approximately $250,000 for site, building and added equipment. Benedict & Company manufacture the Yukon domestic and commercial refrigeration equipment.

WIRE CLOTH COMPANY DISSOLVED—Corporate existence of The New Jersey Wire Colth Company, Trenton, N. J., ceases Jan. 1, and after this date will be continued by the John A. Roebling's Sons Company of which it has been a subsidiary. The sale and distribution of wire cloth, wire netting, wire fencing, wire lath, and wire work will be continued through the parent company at Trenton and through the Roebling branches. The Roebling company will assume all the contracts and obligations of The New Jersey Wire Colth Company, while the same personnel will continue the manufacture and sale of the entire line.

PACIFIC ELECTRIC TO SUPPLY BREAKERS FOR WHITE RIVER PLANT—Contract for furnishing six 69-kv., 10-break oil circuit breakers for installation in the White River hydro-electric plant of the Puget Sound Power & Light Company has been secured by the Seattle office of the Pacific Electric Manufacturing Corporation. The apparatus represents an outlay of $35,000.

Wells Mfg. Co. Absorbs Fichtner & Simon

Wells Manufacturing Company, 673 Folsom St., San Francisco, has taken over the business formerly conducted by Fichtner & Simon at 505 Gough St., San Francisco, and E. C. Fichtner is now associated with the Wells company.

The manufacture of F & S water heaters, special industrial heaters, and thermostats will be carried on in future by the Wells Manufacturing Company.

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WESTINGHOUSE EQUIPMENT GOING INTO LOS ANGELES RADIO STATION—Equipment weighing about 7 tons and valued at more than $25,000, specially built by the Westinghouse company for the new radio monitor station being erected near Point Firmin in Los Angeles Harbor, is being assembled in preparation for installation. Included in the equipment are three Diesel engines which will furnish 100 kw. for the vacuum tubes. The station will be operated by the Radio Division of the Department of Commerce.

GRAYBAR ELECTRIC COMPANY, INC., Seattle, has received a contract for furnishing $40,000 worth of suspension-type insulators to be used for transmission line work in connection with the Rock Island development of the Puget Sound Power & Light Company.

NEW GENERAL ELECTRIC PLASTIC DEPARTMENT—The various plastic activities of the General Electric Company have been co-ordinated into one department known as the plastic department, according to a recent announcement of Gerard Swope, president of the company. R. E. Coleman has been appointed manager of the new department with an advisory committee consisting of Vice-presidents J. G. Barry, chairman, W. R. Burrows, and C. E. Eveleth. The new department will be responsible for sales, engineering and manufacturing of plastics and involves activities at the Pittsfield, Schenectady, Fort Wayne, Erie, and Lynn (River) plants of the company.

TO SELL WUELKER EQUIPMENT IN EAST BAY DISTRICT—Sales in Oakland, Berkeley and Alameda, Calif., of lighting equipment manufactured by the Wuelker Reflector-Lighting Corporation, of San Francisco, will be made through the Henck Company, which has opened a new store and display room at 438 19th St., Oakland. Charles L. Henck is president of the Henck Company.

VANCOUVER FIRM REPRESENTS MAJESTIC REFRIGERATOR — General Distributors, Ltd., of Vancouver, B. C., have been appointed as wholesale distributors for the Majesic electric refrigerator, it is announced by W. C. Clark, general manager. Mr. Clark recently returned to Vancouver after a visit to the Majestic factory.

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Sales Room Is Display Laboratory

ELECTRICAL dealers visiting Chicago may get good suggestions for the set-up of their own stores while selecting material for their stocks. On the fourteenth floor of the new Merchandise Mart, the world's largest building, the General Electric Supply Corporation has established this salesroom and exhibit arranged as a modern electrical store. The salesroom is to be a display laboratory where new merchandise ideas may be put into definite form. Special indirect lighting fixtures of a stepped concentric disk type have been designed, and interesting lighting effects that give each item its proper prominence are being obtained.

George E. Cullinan Wins 1930 Wholesalers' Medal

The wholesalers' medal and purse for 1930, given under the James H. McGraw Award, was presented at the meeting of the National Electrical Wholesalers Association at Pittsburgh, Pa., in November to George E. Cullinan, vice-president, Graybar Electric Company, New York. Mr. Cullinan was given the award in recognition of his constructive contribution to the advancement of the wholesaling branch of the electrical industry through his persistent and unselfish labor for the education of the industry in the economics of distribution.

The committee of judges which awarded the medal to Mr. Cullinan consisted of J. L. Owen, George Patterson, and Walter Williamson.

In 1925 the medal and purse were awarded to William R. Herstein; in 1927 to O. Fred Rost. In 1926, 1928, and 1929, no wholesalers' awards were given.

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Edward N. Hurley Endows College of Commerce

Foundation of a College of Foreign and Domestic Commerce at the University of Notre Dame, Ind., has been made possible by the recent donation of $200,000 by Edward N. Hurley, of Chicago. Mr. Hurley is chairman of the board of Hurley & Company, Chicago, and a founder of the Hurley Machine Company, manufacturer of Thor products.

During the World War he served as chairman of the U. S. Shipping Board and president of the Emergency Fleet Corporation, and was President Wilson's shipping advisor at the Peace Conference in Paris. President Hoover recently appointed him a member of the advisory shipping committee to investigate and make recommendations for the future development of the American merchant marine.

Mr. Hurley was led to make his donation in part by a desire to commemorate the founding of his own fortune through international business. In his letter of gift, he suggested means of visualizing in the new institution the spirit of American business and the importance to all nations of international commerce. The university has expressed its intention of calling the building the Edward N. Hurley College of Foreign and Domestic Commerce.

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CALIFORNIA WAREHOUSES FOR ALTORFER BROS. COMPANY—Warehouses at Oakand and Los Angeles have been opened by Altorfer Brothers Company where stocks will be maintained of ABC washers and ironers and the company's recently announced "Electrotable." The opening of a Los Angeles factory branch office by this company was announced last month.

TO MANUFACTURE NEON BARBER POLE—A neon barber pole has been developed by L. T. Jones, in charge of research and development work for the Neon Specialties Corporation, Oakland, Calif., and is to be marketed nationally. The corporation, formed recently as a subsidiary of the Electric Products Corporation of Oakland, will use a floor space in excess of 10,000 sq.ft. where manufacturing and assembling will be done. Other neon specialties are to be manufactured at the plant. Officials of the Neon Specialties Corporation are: President, J. W. Harris; vice-president, W. E. Joose; secretary-treasurer, H. Owen. M. C. King is general sales manager.

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Kelvinator Makes Changes In Western Districts

Promotion by Kelvinator of J. S. Cortines, former district manager in

J. S. CORTINES

Oregon, Washington, Colorado, Texas, Oklahoma, and New Mexico, makes him a regional director of all sales in the entire western half of the United States. His headquarters are in Los Angeles. Herbert W. Browne has been assigned to the territory formerly covered by Mr. Cortines, with headquarters at Dallas, Texas.

Lawrence W. Klein, until recently sales manager of the Walker Electric Company, Kelvinator distributor at Boise, Idaho, has been appointed a district manager with headquarters at Boise. He will be in charge of the Northwest territory formerly handled by Gordon J. Malone, who has been transferred to the East.

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REPRESENTING FIXTURE MANUFACTURERS—Keeler, White Company, with offices and warehouses at San Francisco, Los Angeles, and Seattle, has been appointed Western sales representative of the three divisions of the Beardslee Chandelier Manufacturing Company, of Chicago. Through the Beardslee Chandelier Division, the Williamson Division, and the Beverly Division, the Keeler, White Company can supply the lighting requirements of the home, school, church, and commercial and public buildings.

Manufacturers Oppose Detailed Drawing Rule

Opposition to the practice of requiring detailed working drawings with bids on electrical equipment or as an element of contract was expressed in a resolution adopted Nov. 21, 1930, by the executive committee of the National Electrical Manufacturers Association.

This opposition, the association states, does not apply to such outline drawings of apparatus showing overall dimensions, assembly drawings of major components, wiring diagrams, performance data and other diagrams, charts, photographs and instructions as are needed for installation, operation, and maintenance purposes.

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LUMBER COMPANY BUYING TRANSFORMERS AND MOTORS—A contract has been placed with the Seattle office of the Allis-Chalmers Manufacturing Company for furnishing $4,000 worth of transformers to be installed in the plant of the White River Lumber Company at Issaquah, Wash. The equipment includes three 33-, one 37½-, two 25-, and two 10-kva. transformers. The lumber company has accepted the Westinghouse company's bid for furnishing 54 motors, ranging from 15 hp. down, to be installed in the plant's new building. The motors will be used for individual drive in the plant.

PERSONAL CHANGES IN LINCOLN ELECTRIC—Changes in personnel of The Lincoln Electric Company, Cleveland, Ohio, include the appointment of S. H. Taylor, Jr., to succeed W. S. Stewart in charge of the company's business on the Coast with headquarters at 812 Mateo St., Los Angeles. Mr. Stewart has recently been appointed district manager of the Cleveland territory of the Lincoln company. Appointment of L. P. Henderson as manager of the San Francisco office of this company also is announced.

PHOTOFLASH LAMP PRICE REDUCED—A substantial price reduction on the new Photoflash lamp for professional and amateur flashlight photography has been announced by the General Electric Company. The lamp, formerly retailing at 40 cents, now lists at 25 cents.

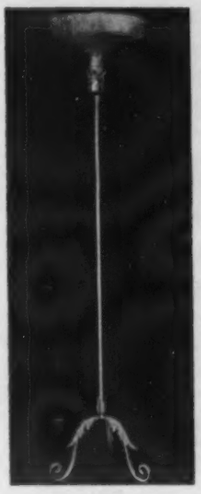
FOG TYPE INSULATOR SURVEY—A survey of the performance of Lapp standard fog type insulators on a 10.3-mile line of the Galveston Electric Company, of Galveston, Texas, has recently been completed by A. C. Nielsen Company, of Chicago.

IN CHARGE OF DISHWASHER SALES—The Hill-Kettering Manufacturing Company, of Berkeley, Calif., has appointed the General Sales Corporation, San Francisco, Pacific Coast distributor of its Dish-Maid electric dishwashers and dryers.

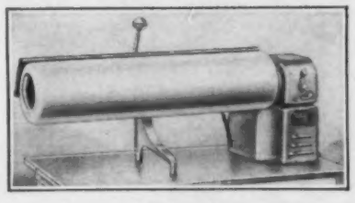
New Products

Inverted Reflector Lamp

The Wuelker Golden-Glow Invertashine, a new aluminum inverted light recently designed by the Wuelker Reflector-Lighting Corporation, San Francisco, for use in apartment houses, offices, hotel lobbies, and other locations, is shown at left.



The unit consists of a wide aluminum reflector, finished inside with a patented substance known as "Wuelker Diffusion," mounted upon a light, ornamental stand, and entirely finished with a heavy, stippled gold enamel. Ten feet of golden silk cord and a split plug, equipped with medium base socket for use with a 300-watt bulb, are supplied. The height of the complete unit is about 70 in., and the diameter of both reflector and base is 16 in. Retail price, $15.— ELECTRICAL WEST, Jan. 1, 1931.



Portable Ironer

A full-automatic portable ironer recently placed on the market by the Automatic Washer Company, Newton, Iowa, weighs but 50 lb. and can be stored in less than 1 ft. of space when stood on end. The ironer has a 90-sq.in. ironing surface and its free roll, 6 x 26 in., can be rotated in either direction. The shoe is of formed steel, chromium plated, with 1,200-watt element. Bearings are oilless and a Westinghouse motor is employed.—ELECTRICAL WEST, Jan. 1, 1931.

Movable Brackets

Beverly movable brackets in eleven styles have been designed by the Beverly Division of the Beardslee Chandelier Manufacturing Company, 218 South Jefferson St., Chicago, to provide a means of conveniently rearranging lighting and furniture without the restrictions of fixed lights.

These brackets are not fastened to the wall and are not "portable," the manufacturer points out, but are used flat against the wall, so that they can be used on either side of and also behind a piece of furniture, and the furniture put back as close to the wall as before. The bracket illustrated, in pewter and colonial brass, retails for $45.—ELECTRICAL WEST, Jan. 1, 1931.

"Handy Ann" Mixer

Characterized as the "mechanical arm for the modern kitchen," the new Hotpoint "Handy Ann" mixer of the Edison General Electric Appliance Company, 5600 West Taylor St., Chicago, is equipped to perform all sorts of odd jobs about the kitchen. It has a potato mashing attachment, wire beater for beating eggs, attachments for making frosting, batter, mayonnaise, meringues, etc., a grater for cheese, chocolate, bread crumbs, a shredder for vegetables or fruits, a sharpener for knives and scissors, and a buffer for flat silver or kitchen cutlery.

The mixer is portable, weighing 16 lb. The motor has two speeds, the required speed being obtained merely by plugging an attachment arm into the correct motor attachment, which is marked "slow" or "fast." The attachment arm has an adjustable feature and allows the homemaker to use any bowl or pan, and the bowl-holder allows her to leave the food while it is being mixed. Retail price, $68.50.— ELECTRICAL WEST, Jan. 1, 1931.

"Electrotable"

Entrance into the kitchen appliance field is made by Altorfer Bros. Company, manufacturers of electric washers and ironers, with the introduction of the ABC Electrotable, an appliance that mixes dough, mashes potatoes, beats eggs, cuts shortening into flour, creams butter, whips cream and mayonnaise, strains fruits, chops, grinds, shreds, chips, and extracts fruit juices.

Equipment of the Electrotable consists of a flat beater, slicer plate, wire whip, pastry knife, ice chopper, fruit juice extractor, oil dropper, mixing bowl, dough hook, food chopper, shredder plates, colander and sieve, vegetable slicer, and coffee and cereal grinder. All of these attachments are kept on sliding shelves in the under part of the table when not in use.

Two sockets at one side furnish connections for operating electrical percolator, toaster, egg-cooker, stove and many other devices. The Electrotable may also be equipped with the new ABC ironer; this attachment, however, is not included in the intended retail price of $225.—ELECTRICAL WEST, Jan. 1, 1931.

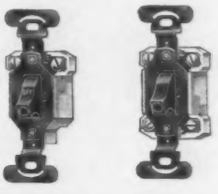
Electric Clocks and Heater

Two new electric clocks and a reflector-type heater are announced by The Cincinnati Victor Company, of Cincinnati, Ohio.

The Kenilworth model clock has a Bakelite case 8½ in. high, which makes it particularly suitable for desk or mantle use, or for placing on top of a radio cabinet. The copper dial, with embossed figures, is 4 in. in diameter, and is covered by a convex glass. The mechanism is completely enclosed in a dust-tight case. It is offered in a variety of finishes at the retail price of $9.75.

The metal case of the Waverly model kitchen clock is 7⅝ in. in diameter and the white enameled metal dial, 5 in. in diameter, is covered with convex glass. It is available in chromium finish or in colors to match any kitchen color scheme. The intended retail price of this model also is $9.75.

The Speed Ray electric heater, obtainable in green, red, or blue, has an 11⅝-in. chromium plated reflector. Circular configurations project the heat rays from the screw-type element with great speed. The specially designed base is constructed to present tipping and, should it be knocked over the heater will roll on its back. Retail price, $4.75. ELECTRICAL WEST, Jan. 1, 1931.

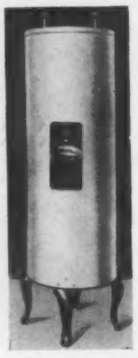


Switches for Fast Wiring

Two new tumbler flush switches, No. 1,301 single-pole, and No. 1,303 three-way, designed for low-priced installations, make wiring fast and easy in the shallowest switch box, according to the Arrow Electric Division of The Arrow-Hart & Hegeman Electric Company, Hartford, Conn., manufacturer of the switches. Roller action of mechanism with wiping contact makes the switches quiet in operation.— ELECTRICAL WEST, Jan. 1, 1931.

Automatic Water Heater

"It Won't Burn Out" is the slogan carried by the Electromatic Manufacturing Company, Inc., 133 Kossuth Street, Newark, N. J., on its "Electromatic" automatic water heater. The heating element of this heater, the manufacturer explains, is practically indestructible and is immersed in a vacuum tube of oil which extends down through the center of the tank. The element heats the oil, the oil quickly heats the large surface of the tube, and the tube heats the water. The elements can be had in capacities of 1,000, 1,500, 2,000 or 3,000 watts, 110 or 220 volts, a.c. or d.c.



The heater is equipped with thermostatic control, operated by a mercury tube. Either full- or part-automatic operation of the heater may be had. The metal jacket encasing the heater is made of auto body steel, finished in white, pea green or gray.

Prices given are $135 for the 18-gal. size and $165 for the 30-gal. size.—ELECTRICAL WEST, Jan. 1, 1931.

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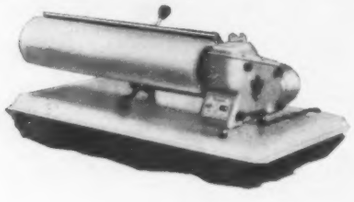
Maytag Ironer

A portable iron has been introduced by The Maytag Company, Newton, Iowa, as a companion to the Maytag washer. The ironer sits on the kitchen table or on a special table designed for the purpose. When set on end for storage in a closet or cupboard it occupies a space 10½ x 15 x 33 in.

A convenient switch makes the ironer automatic in operation and a red signal light tells the operator whether the heat is on or off. The case is all aluminum, bringing the weight of the ironer to 47 lb. Working parts are of hardened steel and run in a bath of oil. No oiling is necessary. The roll is 26 in. long and 6 in. in diameter. The ironing shoe contains a 1,200-watt heating element. The feeding through of ruffles and small flat pieces is simplified by a special curved lip on the shoe which makes it unnecessary to stop the roll and raise the shoe as each section or piece is ironed. There is a special control which provides for pressing trousers and other garments, or for steaming velvet, neckties, or ribbon.—ELECTRICAL WEST, Jan. 1, 1931.



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Pipe Line Welder

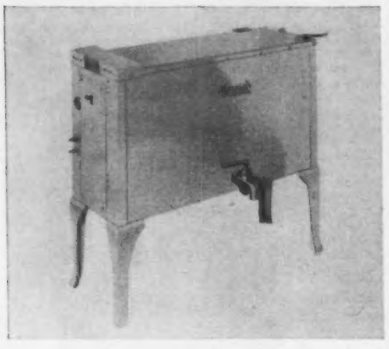
A new 600-amp., single-operator, engine-driven welder for pipe line welding has recently been placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The demand for higher speed in welding gas and oil pipe line joints in the field has led to the development of this special welder for use with high-speed, high-current, large-size, coated electrodes using high-voltage arcs. While the machine is designed primarily for use with such electrodes, the application of the "FlexArc" principle permits equally good operating characteristics and arc stability on the low-current ranges with small electrodes. The machine is particularly adapted to rough and severe field service where sustained loads and high currents are required over long periods.—ELECTRICAL WEST, Jan. 1, 1931.

Dairy Water Heater

Designed to fill the need for a means of conveniently heating water for dairy purposes, the Monarch electric dairy water heater, obtainable in 5- and 13-gal. sizes, has been placed on the market by the Malleable Iron Range Company, of Beaver Dam, Wis.

Monarch heaters are of the open type, permitting the heating of any amount of water up to the capacity of the container. The tank is thoroughly insulated and is fitted with an insulated cover, making it possible to retain water at a high temperature for some time after the current has been turned off. The design of the heater enables dairy men to insert the cup of a milking machine into the tank for cleaning and sterilizing purposes. The unit itself is of the immersion type, and is placed at the bottom of the tank.

A recent test disclosed that with 5 gal. of water in the tank and room temperature at 76 deg. the temperature of the water was raised to 176 deg. in 43 min., the operation consuming 1.359 kw.-hr.—ELECTICAL WEST, Jan. 1, 1931.



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Sandwich Toaster

This new Everhot chromium plated sandwich toaster made by The Swartzbaugh Manufacturing Company, Toledo, Ohio, features an elevated type hinge that is designed to prevent the smashing of the sandwich and also permit the top of the toaster to be fully opened so that the grids may be used as a heating surface. The cover of the toaster is equipped with a heat indicator and two large sandwiches may be toasted at once in the appliance. Retail price, $12.50.—ELECTRICAL WEST, Jan. 1, 1931.

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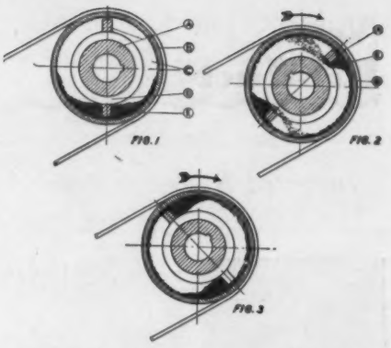
Clutch Pulleys and Couplings

Clutch pulleys and clutch couplings in a new line being placed on the market by The Hill Clutch Machine and Foundry Company, 6400 Breakwater Ave., Cleveland, Ohio, are entirely automatic both in pick-up and in release, and thus keep the load on the motor within adjustable predetermined limits, according to the manufacturer. Not only can the regular type of motor be used instead of the more costly slip-ring or high-torque types, but the manufacturer points out that in many cases a decidedly smaller motor and less expensive switchgear are required.

There are two main parts to the clutch—an inner rotor carrying impeller blades having orifices at the points where they are attached to the shaft; and an outer shell with serrations set lengthwise all around its inner face. The clearance between the impeller blades and the serrated shell-surface is very small. A certain definite



quantity of chilled steel shot is placed in the shell, and the two ends of the clutch are closed by dustproof snap-ring holding plates. The impeller portion is connected to the drive side of the clutch, and the outer shell to the machine to be driven.

When the clutch is at rest, the chilled shot lie at the bottom of the shell. On starting the motor, the impeller blades revolve, driving the shot before them over the serrated surface. Some of the shot escape through the impeller orifices, and some are thrown outwards against the serrations by centrifugal force. As the motor speed increases, however, more and more shot are forced outwards, thus gradually increasing the clutch action. Finally, when the motor has attained full speed, all the shot are tightly packed ahead of the impeller blades and transmit the full power to the driven element of the clutch.

In the event of an overloading of the driven machine, its speed decreases. This at once causes the packed shot to slip until safe balance is reached. Thus the load on the motor can never exceed that for which the clutch has been set. The slipping point is determined by the size of the charge of shot within the clutch, and may be set with great accuracy. A telltale spring cam engaging with pins on the outside of the impeller unit affords an audible clicking signal which ceases as soon as the clutch is up to speed.

Fig. 1. Clutch at rest. (A) winged impeller, (B) serrated drum, (C) dustproof end sealing ring which prevents leakage of chilled shot charge, (D) orifices in impeller which distribute shot to insure dynamic balance and to assure slow acceleration and steady clutch engagement, (E) chilled shot. Fig. 2. Speed increases. Part of the chilled shot escapes through the impeller orifices and part is driven outwards against the serrated surface. Fig. 3. Motor is now at full speed. Shot is tightly packed against serrations and transmits full power.—ELECTRICAL WEST. Jan. 1, 1931.

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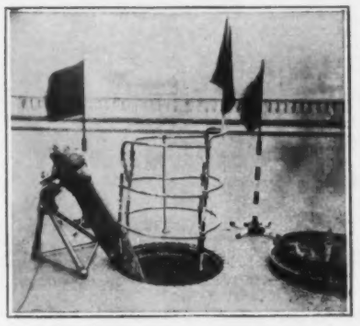
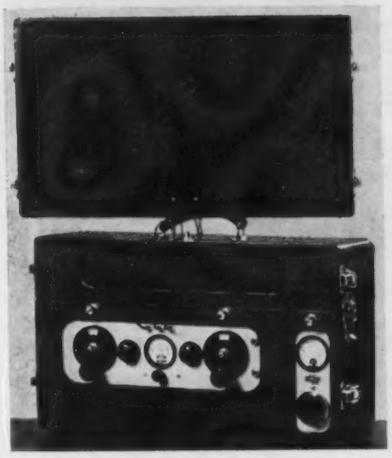


Manhole Blower

A quick method of overcoming the hazards of manhole work by expelling accumulation of carbon monoxide gas is afforded by the use of a light-weight blower recently brought out by the Coppus Engineering Corporation, Worcester, Mass.

According to the manufacturer, a job of expelling gas that formerly required half an hour or more can be accomplished with the Vano blower in five minutes. The equipment weighs less than 100 lb. and can be quickly set up and placed in operation by one man. Attachment for the electric current is made at any convenient outlet. The device itself is of a propeller type. —ELECTRICAL WEST, Jan. 1, 1931.



Radio Trouble Finder

"Trouble Finder-8," recently introduced by Hallock-Watson & Yonge, 191 Park St., Portland, Ore., is a complete eight-tube radio set, having seven UX230 and one UX231 tubes, used to detect radio interference caused by power lines. The set contains standard A, B, and C batteries, loudspeaker, and loop. The built-in volume indicator, consisting of tube rectifier and sensitive milliameter, permits the intensity of a noise to be heard and to be read directly on the meter, its sound noted in the loudspeaker, and its direction spotted with the loop, all simultaneously.

External dimensions of the set are 8 x 13 x 21 in.; weight 35 lb. Price, complete with all batteries and tubes, is $160 f.o.b. Portland.—ELECTRICAL WEST, Jan. 1, 1931.

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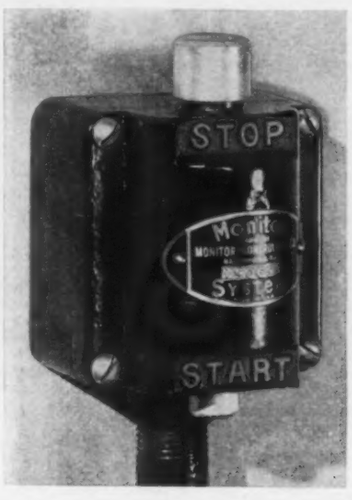
Push Button Switch

For momentary contact control, especially suited for machine service, the Monitor Controller Company, of Baltimore, Md., has designed the Monitor ironing push button switch for a.c. or d.c. circuits.

Features claimed for this switch include quick-action inching, massive and flexible contacts. The location of the buttons makes for unusual safety. The stop button being on top fully exposed is easy to operate; the start button is below, fully protected from accidental contact. Special construction makes the switch dripproof and splashproof.

The construction is simple, consisting of two parts, the base which carries the wiring and fixed contacts, and the cover, carrying the buttons. Conduit connections can be made from top, bottom or either side. Push buttons being at top and bottom, there are no horizontal projections to damage.

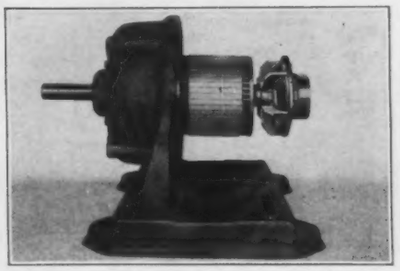
Dimensions are: Overall height, 4¼ in., width 2 15-16 in., depth from mount 2⅜ in.—ELECTRICAL WEST, Jan. 1, 1931.



"Unit Type" Motor

Two new design features are presented in a new line of "unit type" motors being manufactured by The Ideal Electric & Manufacturing Company, Mansfield, Ohio. The first is the placing of the motor feet on the bearing brackets. This feature allows all load shocks and strains to be carried directly to the motor support. When the front end bracket and stator are removed, the pulley end bearing bracket remaining bolted to the base will still support the rotor and gear, pulley, or other connection to the driven machinery.

Second, these motors are built using standardized units (rotors and stators) which are interchangeable for all types, allowing them to be built into machinery where formerly it was impossible to incorporate an individual motor drive. The motors also have interchangeable ball, roller, or sleeve bearings, anti-friction bearings being supplied as standard.—ELECTRICAL WEST, Jan. 1, 1931.



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Cable Connectors

A new group designed for general application to outdoor and indoor service has been added to its line of connectors for tubing, rod, and cable by the Burndy Engineering Company, Inc., 230 East 45th St., New York.

A feature of the connectors is that when once installed they can be locked. The design is based on the multi-grip principle. Each bolt and gripping surface acts independently to produce a series of high pressure areas about the conductor.

Round head, oval shank bolts are used on all connectors, giving a neat appearance and requiring only one wrench to install.—ELECTRICAL WEST, Jan. 1, 1931.

Trade Literature

¶ NEW LIGHTING APPLICATIONS—Lighting data sheets published by the Illuminating Engineering Society, showing the application of Benjamin lighting equipment to some unusual lighting problems, are being distributed by the Benjamin Electric Manufacturing Company, Des Plaines, Ill. The pages are intended for filing in the Benjamin Lighting Data binder. Another recent addition to the binder is a sheet devoted to the lighting of outdoor skating and hockey rinks.

¶ EXERCISER SALES MANUAL—A comprehensive "Master Healthizer Retail Sales Manual" has been compiled by The Master Electric Company, Dayton, Ohio, for use by dealers' salesmen.

¶ ELECTRIC TRAINS—A handbook entitled "How to Sell Lionel Trains" has been compiled by the Lionel Corporation, 15 East 26th St., New York, to familiarize salesmen back of retail store counters with the characteristics and operation of Lionel electric trains.

¶ AUTOMATIC CONTROLLER VALVES—Catalog No. 2002 illustrating and describing the automatic controller valves, motor operated types, manufactured by The Bristol Company, Waterbury, Conn., has recently been issued by that company.

¶ TERMINATORS—Bulletin No. 65-B, listing terminators for use in sealing ends of high-voltage cables, has recently been issued by the Delta-Star Electric Company, 2400 Block, Fulton St., Chicago. A complete listing of wet and dry flashover values is given in this publication.

¶ LIGHTING FIXTURES — Catalog W-10 illustrating the Williamson "Shade-Lyte" series of lighting fixtures has recently been issued by the Williamson Division of the Beardslee Chandelier Manufacturing Company, 220 South Jefferson St., Chicago.

¶ ELECTRIC FLOW METERS—A unique card has been designed by The Brown Instrument Company, of Philadelphia, which, by means of a novel tab pulling device, demonstrates the inductance bridge principle applied to the flow meters manufactured by this company.

¶ PLUGS AND RECEPTACLES—In Bulletin No. 2213 of the Crouse-Hinds Company, Syracuse, N. Y., entitled "Safety Circuits for Electrical Equipment," "Arktite" plugs and receptacles for effectively grounding portable electrical equipment are described.

¶ CENTRIFUGAL PUMPS—Type "SSU" centrifugal pumping units, manufactured by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., are the subject of that company's recently issued Bulletin No. 1657.

¶ PHASE SEQUENCE INDICATOR—A recent bulletin of the Meter Devices Company, Conton, Ohio, announces the Knopp phase sequence indicator manufactured by Electrical Facilities, Inc., Oakland, Calif., and being marketed by the Meter Devices Company.

¶ SURFACE BOXES—The complete line of cut-out boxes, flush cabinets, pull boxes, wiring troughs, special boxes, fusecabs, and guttered and weatherproof cabinets manufactured by the All-Steel-Equip Company, Aurora, Ill., is covered in the company's recently issued Catalog D-1.

¶ GROUNDOMETER—The construction, general principles of operation, and methods of using the Type E Groundometer manufactured by the Borden Electric Company, 480 Broad St., Newark, N. J., are set forth in the company's bulletin No. 120.

¶ G-E PUBLICATIONS—Recent publications of the General Electric Company, Schenectady, N. Y., include the following:

GEA-1031B: G-E Type AW Resistor Arc Welders.

GEA-1326: Totally Enclosed, Fan-cooled Induction Motors.

GEA-727B: Hesitating Control Relays for D.C. Circuits.

GEA-1193A: Automatic Switchgear.

GEA-721: Indoor Bus Supports.

GEA-959B: Type FKR-155 Oil Circuit Breakers.

GEA-372A: Explosion Chambers for Oil Circuit Breakers.

GED-416: Lighting—The Remedy for Unfilled Grand Stands and Bleachers at Football Games.

GEA-1254: G-E Textile Molded Control Pulleys for Aircraft.

GEA-140A: Hand Starting Compensators for Squirrel-cage Induction Motors.

GEA-841A: CR7006-D40 Magnetic Switch.

GEA-1293: G-E Wing-Edge Landing Lights for Aircraft.

GEA-579B: Automatic Full-Voltage Controllers for Synchronous Motors.

GEA-1321: Air-cooled Transformers for Railway-Signal Service.

GEA-1269A: Announcing the new WF-1 instrument current transformer.

GEA-1261: Oil-filled Coupling Capacitors for Carrier-Current Applications.

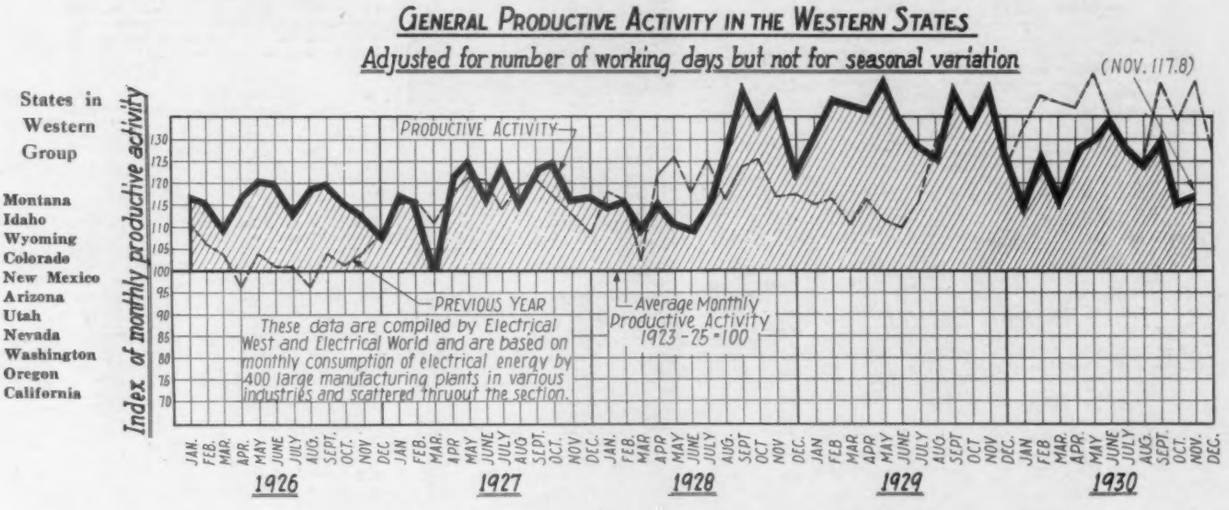
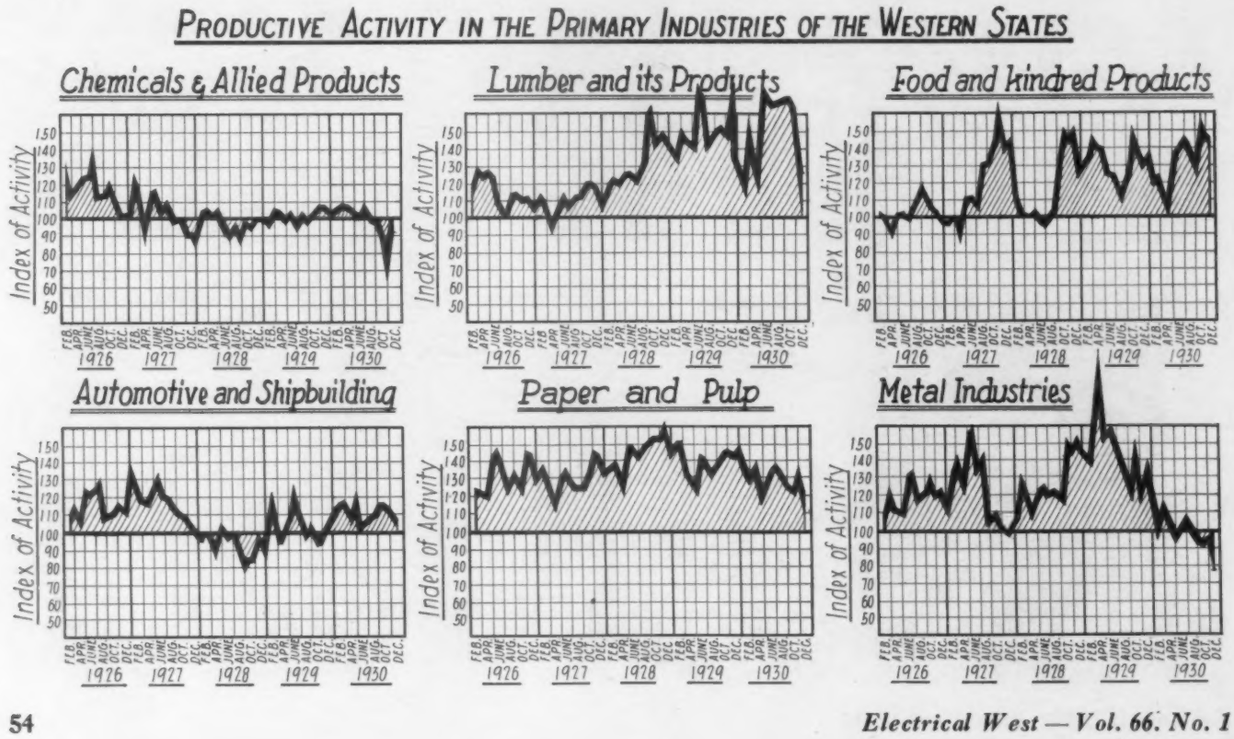
Barometer

INDUSTRIAL activity in the Western states increased slightly during November, the rise being between 1 and 2 per cent, virtually the same as in the United States as a whole, according to returns on electrical energy consumption made by industrial establishments. The most noteworthy increase was in the chemical industry group, including petroleum refining, which advanced 42 per cent. The stone, clay and glass group also advanced sharply. Foor industries fell off by 3 per cent, but at this season a moderate decrease is to be expected. In the metal industries there was a decline of 15.5 per cent; in pulp and paper manufacturing 10.6 per cent.

Compared with the same month last year Western industry declined slightly more than industry in the entire country, with a drop of 17.6 per cent against 14.3 per cent, but of the chief industries foods are up 5 per cent and the stone group is on its previous level. All others decreased.

While the eleven-month average declined nearly 9 per cent, the loss was concentrated largely in the metals group. The three other predominant groups—chemical and allied products, food and kindred products, and forest products—show almost identical figures for the period in both years.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days)

	Nov. 1930	Oct. 1930	Nov. 1929	Av. First 11 Months 1930	Av. First 11 Months 1929
All industry	117.8	116.1	142.6	124.7	136.6
Chemical and allied products	91.3	64.1	109.7	98.0	99.9
Food and kindred products	146.3	148.1	131.3	136.6	135.1
Forest products	126.4	164.0	184.6	155.7	156.6
Metals group	78.0	92.3	141.7	97.2	148.6
Paper and pulp	122.8	137.2	144.8	131.1	142.6
Rubber and its products	123.1	151.8	137.0	155.6	178.8
Shipbuilding	107.8	113.0	107.1	113.2	103.5
Stone, clay and glass	126.0	92.0	121.0	103.7	139.4